

AVIATION WEEK

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MAY 9, 1955

50 CENTS



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PUBLISHED FOR BETTER UNDERSTANDING OF THE MISSION OF THE U.S. A.F. AIR DEFENSE COMMAND

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New Holley turboprop power control installed in Lockheed R7V-2

One hundred and six passengers or 36,000 pounds of cargo cruise at speeds up to 340 mph per hour in the Navy's new Lockheed R7V-2 turboprop Super Constellation. Four Pratt & Whitney Turbo-Compound T-34 gas turbine engines, developing a total of 22,000 horsepower for take-off. Each of the four is automatically controlled by a new Holley gas turbine power control.

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NOTHING MOVES LIKE A BALL

Domestic

First test flights of an improved C-16, modified by L. B. Smith Aircraft Corp. and Air Cargo Express Service (ASW May 2, p. 21), are slated to begin today, May 9, at Miami International Airport.

Northwest Orient Airlines ordered four more jet transports from Douglas Aircraft Co., increasing its contract to 14 airplanes at a total cost of \$29 million. The order calls for eight DC-7Cs to be used on routes to the west, the Philippines and Japan and six DC-6Bs for domestic routes. Deliveries on DC-6Bs will start in January 1957, with DC-7Cs following in March.

North American Airlines started operating DC-58 flights between Los Angeles and New York May 1. Flight time set for the new 7 hr 55 min nonstop and 5 hr 55 min west-bound.

Adm. John H. Towers, "father of U.S. Naval Aviation," died Apr. 30 in New York. One of Navy's first pilots, Towers commanded the transatlantic NC-4 flight in 1919, became chief of the Bureau of Aeronautics in 1939, rose to commander in chief of the Pacific in 1945 and was appointed chairman of the Navy Department's Board in 1947. After he retired, the retired naval aviator, American World Airlines as a vice president and later became president of the Flight Safety Foundation.

Merger proposal between Bell Aircraft Corp. and Pressed Steel of America, Inc., Port Huron, Mich., was defeated by stockholders of the Mich. gas company. The vote: 218,204 against 2,417 for.

Widely Airline purchased five C-46 cargo transports from West Coast Airlines, bringing its total C-46 fleet to 35.

Financial

General American Corp., New York, reports consolidated net income of \$1,014,800 for the first quarter of 1955, compared with \$1,315,000 for the same period last year. Sales totaled \$142,246,000, increasing from \$129,352,000. Bookings \$1,915 million.

Roll Aircraft Corp., Buffalo, N. Y., had net income of \$1,582,000 for the first quarter from sales totaling \$48,448,000. This compared with a



First French Jet Liner Starts Tests

France's first jet liner in the end jet transport field will soon be up to start ground tests. The 70-passenger Sncm Caravelle 6R-20 is scheduled to make its first flight in mid-June. Estimated payload of the passenger carrier is 10,000 lb. First full-rate service R.R. 146. Cruising speed is estimated at 500 mph.

\$1,699,800 net and sales of \$45,000,000 during the first three months of 1954. Bookings Apr. 5: \$158,191,000.

Franklin Engine & Airplane Corp.'s net income for the first three months of 1955 dropped to \$1,101,000 from \$1,164,000 reported for the same period last year. Sales were \$37.5 million compared with \$36.9 million. Current backlog totals approximately \$200 million. The Hagerstown, Md., company declared a 27 cent dividend, payable June 1 to stockholders of record May 16.

Lockheed Aircraft Corp.'s backlog May 31 totaled \$1,095 million, compared with \$1,245 million a year ago.

Trans World Airlines reports a net loss of \$3,978,000 for the first quarter of 1955, compared with a \$3,061,000 deficit for the 1954 period. Revenues totaled \$47,513,000, a 7.1% increase.

Delta-C&S Air Lines reports net earnings of \$1,064,000 and operating revenues of \$45,456,000 for the first quarter. Bookings ended May 31. The airline declared a 30 cent dividend, payable June 6 to stockholders of record May 18.

Texas Aircraft Corp. paid \$476,552 shares of common on the New York Stock Exchange last week. The Dallas company also reported net earnings of \$551,760 for the first quarter of this year, a 7.5% drop from the same period of 1954. Sales totaled \$11,511,000, a 14.5% increase.

Boeing Airplane Co. declared a regular quarterly dividend of 10 cents a share and a special 75-cent payment,

payable June 10 to stockholders of record May 26.

International

British engine builders last week confirmed an Avianco West report (Oct. 29, 1952, p. 15) that two rocket-powered jets of the Bristol Engine Co. and the Bristol Engine Co. are being developed for high-performance aircraft capable of operating in a single atmosphere.

Lines Budget, 75, French airline parent who built and flew its first aircraft in 1907, founded the Society of Lines Budget. Western Worldlines in 1911 and founded the International Air France in 1932, died May 4 in Paris.

First prototype G-91, Fiat's winning contender in the NATO lightweight fighter competition (NAO Apr. 15, p. 15), made its first test flight last week at Turin. The NATO contract calls for three prototypes and 27 production fighters.

West German Luftwaffe's third Super Constellation of four ordered from Lockheed Aircraft Corp. arrived May 1 in Hamburg. Super Constellation will operate on the Berlin route. Lockheed's note to New York, scheduled to open next month.

Trans-Australia Airlines ordered three additional Viscount 700Ds from British Vickers-Armstrongs Ltd., increasing TAA's total contract for the turbo-prop-powered airplane to 10.

New \$200 million terminal at Montreal's Dorval Airport will be started this summer and completed in mid-1957.



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McDonnell's new F-8D Voodoo, a super-sonic long-range strategic fighter capable of delivering atomic weapons, depends upon REM-CRU titanium for vital parts . . . just as do most other advanced-type aircraft.

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Washington Roundup

Pearson to ATA?

Top candidate for the postoffice of the Air Transport Act is Harold L. Pearson, 52, an assistant director of the Bureau of the Budget. Pearson is reported to be the leading pick of choice of Earl D. Johnson, outgoing president.

He previously served as deputy to Johnson when the latter was Under Secretary of the Army.

Pearson probably will be elected to succeed Johnson at the next occasional board meeting on mid-June and assume his new duties on July 1. Whether Johnson will stay on at ATA until Pearson arrives or leave immediately for General Dynamics Corp. apparently hasn't been determined.

After entering government service in 1939, Pearson had concentrated a business career in the manufacturing and financial fields. He was associated with Montgomery Ward from 1925 until 1947 and was vice president and treasurer from 1948.

Renegotiation Back

Repeal of Renegotiation Law, which expired last Dec. 31, is certain. The House unanimously passed legislation which would extend it from the expiration date to Dec. 31, 1956. The Senate is expected to do the same shortly.

No Subsidy Money

Civil Aeronautics Board is not expected to ask for additional money to meet airline subsidy payments, which amount that \$8.1 million due the industry is not going to be paid. CAB's requirement for subsidy payments for the first months of fiscal 1955 was \$152 million, but Congress reduced this to \$49 million.

The first demand as to which carriers should be paid—or not paid—will be made soon by the comptroller general, but this is the outlook.

Passenger due local service lines will be met. This is because the position of the comptroller is that the "aircraft" must be considered in negotiating legislation, and members of the House and Senate Staff stated in a report that local lines should be paid.

The situation regarding helicopter service, trans-Atlantic and intra-Houston services is questionable since the congressional "policy" in this area was vaguely expressed.

International carriers will have the last points on funds. The board feels the position that carriers have the "right" to use the government for payments—determined under the provisions of the 1938 CAA Act.

But the demand that will face airport carriers is that even if they should successfully get a Coast of China decision in their favor they still have to get an appropriation from Congress before it can be paid.

CAB Investigation

General Accounting Office's comprehensive "audit" of Civil Aeronautics Board will be introduced to Congress in approximately a month. It has been underway for about a year—since last July.

GAO's findings will probably have a considerable influence on Congress' attitude toward future appropriations for airline subsidies. The agency, established at a financial

switching over government activities, is responsible only to Congress. It is not a part of the executive branch directly responsible to the President.

The prospect is the report will call for a more rapid rate-making formula to reduce "service" and passenger and more aggressive action to eliminate airline subsidies. CAB is already an agency for lowering subsidies on economic status of individual airlines.

Louisiana vs CAB

The Louisiana congressional delegation continues to voice its opposition to Civil Aeronautics Board's proposed bureau at the fallow to establish direct New Orleans-Mexico City service.

The latest comment is by Rep. Edward R. Roybal. "There is no need for this new bureau and new staff change in connection with the activities of the postoffice board. It is the duty to establish New Orleans-Mexico City service there is something present which does not meet the case and I think do not believe all the cards have been played. Let us see the table and I would not be at all surprised if there were several cards concealed in somebody's sleeve. How to shuck them loose is a real problem."

Nebraska Air Industry Bid

The first political pressure for location of new aircraft and related aircraft facilities in the Mid-West (see p. 13) comes from Nebraska's congressional delegation.

"We fully appreciate the work of our proposal," the delegation wrote Secretary of the Air Force Harold T. Abbott. "and believe that Nebraska affords distinct advantages in such a program." The Nebraskaans are now drawing up facts and figures.

Jet Tanker

USAF says Boeing Airplane Co. will not be permitted to use any of the work on the KC-135 jet tanker contract to develop a commercial prototype. Assistant Secretary for Military Requirements said "We bought that airplane to meet a military requirement and would not use that work in a commercial development. It is going to be used as we are going to talk about anything else. There is no authority given them to use any of the work we are doing for purposes other than meeting our requirements for tanker airplanes."

The latest statement followed a request for Boeing that a commercial transport will be ready for delivery in 1955 (AW May 2, p. 35).

Facility Policy

Tightening of Defense Department policy on use of government-owned industrial facilities is indicated by new directive given Thomas P. Pike, Assistant Secretary for Supply and Logistics, junior to senior military programs in the area. Directive (AFR-115) says Defense does not want to compete with private enterprise and will not provide facilities if they can be reasonably obtained on other way. Pike is given responsibility for carrying out the program, moving through to Defense Secretary Charles E. Wilson when he needs help in carrying out.

—Washington staff

Air Force Copes With Nuclear Radiation

Special Weapons Center learns how to operate aircraft in atomic warfare. Pilots fly into bomb cloud.

By Robert Harbo

Indian Springs AFB, Nev.—Pilot and nurses at the Air Force Special Weapons Center are learning how to fly and maintain aircraft safely despite the radiation effects of atomic warfare. Lessons learned by Special Weapons Center crews during radiation exposure in Nevada tests with atomic weapons will have wide application in the future to both military and civil aviation.

Experience in operating within safe limits during radiation exposure of air crews and in handling contaminated aircraft is the second comes from the scientific report furnished by the Special Weapons Center to the Atomic Energy Commission, and spread as research among human "pigeon pie" pilots and observers to get data on radiation necessary for combat operations of Strategic Air Command, Tactical Air Command and Air Defense Command.

► **Special Weapon**—The special aircraft produced the earliest penetration of an atomic cloud by piloted aircraft in history during the current Operation Top jet test series. Nearly a dozen early penetrations of atomic blast clouds were made by a special three scientific team of the 8th Bomber Division, Special Weapons Center Research Directorate without exceeding the AEC radiation safety limits of 15 R in accuracy per year.

The team flew a pair of specially instrumented Lockheed F-33 jet trainers. Pilots are equipped with special radiation protection gear including air purifiers, lead vests and caps. That inside observers in the rear seat wear only normal flight gear plus special instruments to measure the radiation level penetrating various levels of clouds and data.

To measure external radiation absorbed during the dash through the bomb cloud, observers wear a wax coated film badge on a strap. Capsule worn on the stomach during flight and an external film badge is jettisoned up on the strap which the observer holds in his hand.

► **Tactical Data**—First early penetration mission was flown by Capt. Charles B. Caldwell, observer and Lt. Col. Dallas W. McCallister, pilot. Subsequent mis-

sions of the team were segregated by Col. Ernest A. Tamm, director, and Lieutenants John Brown and David Patterson, pilots. Col. Brown, leader of the 8th Bomber Division, is known in atomic energy circles for his role in defining safety criteria for handling radioactive, a vital element in the hydrogen bomb.

Capt. Caldwell, who is also a retired pilot and has a mission design as nuclear engineering, described his first dash through the atomic cloud as distinguished by "a leader air-crew of all the small part after lightning strikes around him exploded everywhere. There is total turbulence inside the cloud. The cloud is heavily boiling and with dashes through all the way from the pilot to a deep brown below. One light time from initial penetration of the atomic cloud to when it does on the Indian Springs runway takes about 10 minutes."

These early penetrations have not yet produced sufficient data to suggest new conclusions other than that they can be made safely without any damage to either aircraft and crew at initial rates of more than 45 minutes before they are serious operations.

► **Scientific Air Support**—The first jet-led penetration during Topjet was preceded by aerial experiments in winter Nevada tests and over Taiwan. Many downed aircraft carrying more and more men into the atomic and hydrogen clouds shortly after detonation. "Empty" crews were also played directly into the blast during Topjet. To maintain high, level and minimum descent. These dashes were badly disrupted but two of the three were recovered.

An aspect of the scientific mission during the Nevada and Nevada tests is provided by the 4925th Atomic Test Group, commanded by Col. Harry Dowdell, with a major role played by the 4926th Test Squadron (Scientific), commanded by Col. James E. Whitman, and some members from a Navy group. The addition of new scientific support

includes plan selection of techniques on older standard aircraft but resulting in a constantly improving amount of detailed data gathered for Atomic Energy Commission laboratories for new weapons development.

First phase of scientific support consists of measuring special effects produced by the detonation in atomic shields and during the first few minutes after being. Douglas Stanzani, flown by Navy pilots and glowing white with special heat-resistant paint and silver heat-reflecting cockpit canopy, measure thermal effects (penetration) in the explosion. Heat effects are noted by Republic F-34H Thunderbolt while Lockheed F-4B jets enter in streams to measure light cloud detonation. Sikorski H-19 helicopters carry radiological instruments to assess fallout in the area immediately around the blast while a Douglas C-47 flies at approximately 500 ft altitude to measure the terrain radiation of atomic debris areas.

► **Sampling Program**—A major scientific support effort in the atomic cloud sampling program that begins within a half hour after take and continues for another hour, using specially equipped aircraft of the 4926th Squadron. A specific sampling program is planned for each mission, based on the matching the scientific objectives of the Air Atomic and Laboratory AEC laboratories with the operational capabilities of the sampling system. Scientific director of the program is Dr. Harold Plank of the University of California.

AEC laboratories and the Special Weapons Center have cooperated in a program to develop special airborne instruments and equipment for the use, plus operations. Sampling pilots are equipped with lead vests, lead seats and special respirators.

A certain amount of radiation absorption by the pilot is unavoidable as performance of this mission. Every effort is made to properly plan penetration, sampling maneuvers within the atomic cloud and when the Indian Springs base so on in exposure of the pilots to the maximum of radiation. Better results are obtained from piloted sampling planes than with drone aircraft.

► **Shadow View**—The pilot is an effective computer that can also identify themselves for his aircraft to be through the constantly changing targets of importance offered by the atomic cloud development such as better than a normally controlled target. "And a new test working on the computer."

Since penetrations are made over an hour-long period, the sampling maneuvers vary with the character of the cloud. Early penetrations require fast maneuvers to hold down the pilot's subjective exposure time while his action acquire



EXPOSED PILOT gets out of F-33, then runs.



RADIATION SAMPLE is lifted from bomb.

larger flight inside the clouds in past, so sufficient radioactive particles in the sample filter tanks to make an acceptable specimen.

The sampler first is directed by Dr. Plank who rides in the Boeing B-59 control plane.

A pair of "F-33" trainers fly around the atomic cloud as it develops and report to Dr. Plank in the B-59 who in turn directs the F-34 sampling aircraft to make their specific penetrations. Since the actual cloud response better than the pre-determined pattern plan, most at least to the variety of special cockpit radiological instruments, all of the F-34 samples are equipped with Low L-5 altimeters. During Topjet, a specially modified Martin B-7 Canberra was added to the sampler fleet for high altitude measurements.

► **40 Hr. in Atomic**—Sampling aircraft when in Indian Springs where they

often encounter radioactive cloud patterns are recovered from wing tanks, jettisoned into lead "pigeon" for safe storage and reduced by Special Weapons Center B-75 recovery aircraft to various atomic energy laboratories for scientific analysis.

SWC accounts report of the last encounter with tracking apparatus by B-25 and B-59 aircraft which follow the atomic cloud until its radioactive effects are at a negligible level. The C-47 carries special aircraft-mounted radioactive fallout. Another C-47 is left during the entire test period to take documentary photographs of the blast and resulting clouds. The B-59 also carries a flight of North American F-55 Sabers aircraft to shoot down dashes that go out of control.

From the time heading the test operation begins until the test cloud breaks up, the F-34s fly 40 hours.

Talbot Clarifies Dispersal Policy

West Coast concern over Defense Department determination not to build new production facilities in that area is a factor in current facilities and possibly Air Force Secretary Harold S. Talbot has emphasized.

Continuing operations in special role output will accelerate construction of new plants. Talbot said last week, and it is USAF policy to put new facilities and nuclear sites, have present defense industry concentration.

Said Talbot:

"We have no idea of deterring the amount of activity, the amount of casualties or the extent of responsibility on the West Coast but we think that for their exposure to depletion of product should be moved probably in the Middle West."

He gave two reasons:

► **Military**—Dispersion of defense plant

targets for safety in time of war.

► **Economic**—Dispersion to protect local business from interrelated disposal rate on materials, product.

Talbot described the Boeing Airplane Co., now developing the Boeing 747-400 at plant in Seattle, is looking for another site as another part of the country for production of the airplane. Middle West factories are under construction.

► **Misinformation**—"This question never came up," he said, "until the question came up of building new facilities for guided missile work. If they are going to build them, we believe it is well to disperse them."

Talbot's statements were made in reply to a wave of criticism from inside West Coast firms, labor unions and the Los Angeles Chamber of Commerce. All were based from space dis-

QF-80 Drones Measure Atomic Damage

Remotely-controlled Lockheed QF-80 drones played another spectacular role in Operation Topjet atomic tests.

Operated by the 3215th Drone Squadron from Eglin AFB, Fla., yellow drones controlled from Lockheed F-33 trainers played directly into an atomic blast for the first time to measure the atomic battle damage in nuclear mushroom cloud.

All three drones sent into the blast were expected to be destroyed before recovery was possible, but two were recovered by the combat pilots to safe landings despite minor atomic damage. The third pulled out of the blast in a cock landing. The downed atomic plane was towed together in a fighter jet resemble with the drone landing.

A spectacular accident occurred during the Topjet operations when a QF-80 another plane flared out during take off at Eglin base and was forced to crash, leaving its motherless child landing down the runway without guidance to a crash end. The start of mother QF-80, circling high above after losing his child, pulled the remaining QF-80s down.

He executed a vigorous climb to a maximum dash, leveling out just over the controlled drone. He took over with his guidance system and pulled the drone off the runway and flew it through a successful test atomic during the shot. The motherless drone happened to be the last QF-80 available for that particular shot. Without this emergency use in the diversion phase plan, the drone portion of this repetitive test would have been impossible.

Drone pilots still risk about the lethal and dangerous area made by a rapid descent plan during the last Eglin test. A QF-80 was shot down at 180 feet altitude and began to plunge toward the test. The diversion phase pilot spotted the runaway drone. He rolled around in an extremely tight turn almost at falling speed just above the water to get the drone under his control and return it within a hair's breadth of disaster.

CAA Orders Further Inspections For Boeing Stratocruiser Props

Propeller facilities which have previously played the Boeing 737 for several years have resulted in a series of Civil Aeronautics Administration enforcement directives (CAW Apr. 11, p. 114), the latest of which calls for stricter inspection measures.

The CAA directive requires that all Hushline Standard 2117 propeller blades with facing type clamps be inspected with X-ray on areas which can't be visually or magnetically inspected.

Inspection of these ribbed plated blades must be done on each aircraft before it leaves a designated point where X-ray facilities are available. Non-ribbed plated blades were to be inspected as soon as possible, but not later than May 5.

► **Blade Clamps**—Operation of Hushline Standard 2117 new plated blades must inspect them under the garter for cracks and correct any corrosion conditions that may exist. Any cracked blades must be immediately removed from service.

This latest directive is the result of discovery of blade cracks a few weeks ago by Pan American World Airways and British Overseas Airways Corp. Both were in areas concerned from airframe inspection by the garter and call attached to the blade near the propeller hub.

The propeller blade involved is a hollow steel model used on the Boeing Stratocruiser. The blade is made of steel steel fitted with a rubber-reinforced compound and by its nature is more brittle and requires more care than solid aluminum types. The Boeing is the only certified transport flying that doesn't have a solid aluminum blade available as an alternate.

► **Accident Record**—The propeller has been shown for most of the major accidents that have occurred with the

Boeing Stratocruiser. A number of accidents, the latest of which occurred near Portland, Ore., in March, have had similar causes and most have been traced to propeller trouble.

In most cases, an engine has been lost.

Two were lost at sea and one in the Bealeton angle, making analysis difficult, but the probable cause in each case has been listed as engine loss through vibration caused by a fractured propeller blade.

The CAA investigation of the Portland incident is still incomplete, but the circumstances seem to fit earlier patterns.

The CAA, Hushline Standard and the current involved have all been actively trying to find the cause of the trouble.

Thus far, no specific fault has yet been found, and remedial efforts have been concentrated in perfecting inspection measures.

Various inspection techniques are being used in a continuing effort to develop a standard procedure.

ICC Official Suggests Military Traffic Split

Strict division of domestic military traffic between the various forms of common carrier transportation has been advanced as a solution to the continuing "cric war" between airlines and railroads.

Interstate Commerce Commission Executive Bureau Field suggested "allocating a specific percentage of military traffic to each transportation group, at least as far as the railroads are concerned, some newly approaching a reasonable maximum level, but at the same time collecting a substantial discount under commercial laws."

His proposal could be implemented, Fuller said, through an informal conference of the regulatory bodies (ICC and CAA), and the military agencies. "Total volume is an estimated 975 million annual volume in passenger traffic of freight in the Defense Department."

Fuller rejected a complaint of the Independent Military Air Transport Association alleging that the railroad's use of "free or reduced" rates to attract military traffic constituted preferential and protection contrary to the national transportation policy.

J35 Production Nears End

Production of the Allison J35-A-15 engine will end this summer.

E. B. Newell, Allison general manager, added: "However, increasing production in two other newer types of engines will provide replacement of those released from production of the J35-A-15."

The J33 engine will continue to be produced in reduced quantities. In closing schedules for the 516 turbo-prop engine and the J71 turboprop will require a major increase in employment, Newell said.

The phasing out of J35 production is due to increased service life in excess from J33 engines and the new version which will have reduced the engine supply.

Airlines to Discuss 'No-Show' Solutions

Discussion of solutions to the no-show problem among trunk and local service carriers has been authorized by the Civil Aeronautics Board.

The board approved a request of National Airlines that the carrier be allowed to discuss the problem of no-shows and multiple cancellations for a six-month period.

The problem is especially critical now since the airlines have decided to eliminate reclassification penalties July 15, and an industry-wide alternate program must be found to replace the controversial non-refundable rule.

The Board told carriers that any solution must meet the test of the CAB "hold the line" policy on passenger fares.

In discussing board the majority opinion, CAB Vice Chairman Joseph P. Adams said that discussion should not include possible fare increases as well as discounts.

Adams believes public benefits will not come from the discussion since a solution will probably result in an increase of charges to air travelers in the face of the current satisfactory profit position of the airlines.

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CONVAIR KFT-1 SEA DART out of the water and on its twin hydrofoils during a run as a demonstration of the experimental hydrofoil, waterborne fighter's Navy aviation program.



GUIDING THE "CORPORAL"

*ELECTRONIC GUIDANCE IS THE
SECRET OF THE CORPORAL'S ACCURACY*

The U. S. Army required a ground-to-ground missile capable of delivering an atomic warhead at supersonic speed—accurately—to a target beyond the range of artillery. Army Ordnance awarded four prime contracts for this project:

PRIME CONTRACT—RESEARCH
Jet Propulsion Laboratory,
California Institute of Technology
Basic research and development
covering all facets of total problem.

PRIME CONTRACT—DEVELOPMENT
Gilfillan Bros., Inc.
Improvement, simplification of ground
and airborne electronic equipment.

PRIME CONTRACT—PRODUCTION:
MISSILE
Firestone Tire & Rubber Co.
Missile and missile handling equipment.

PRIME CONTRACT—PRODUCTION:
GROUND GUIDANCE SYSTEM
Gilfillan Bros., Inc.
Complete ground guidance system.

RESULTS: The Army's "Corporal," ground
and airborne equipment, in full produc-
tion; delivery being made to troops.

Today's missiles are superior to yester-
day's mechanically timed rockets for one
reason—electronic guidance.

It is electronics research and the elec-
tronics industry that put the guidance
into the guided missiles... that share
the major responsibility of keeping
America first in guided missiles.

Primary credit for the "Corporal" is due
to the basic research achievements of
the engineers and scientists of the Jet
Propulsion Laboratory at the California
Institute of Technology. Gilfillan is
proud to have been awarded a prime
contract to assist in the development
and do the production of the vital elec-
tronic guidance system.

In the electronics industry, Gilfillan is a
recognized leader. Gilfillan's ability to
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sively—to approach a total problem as a
whole and achieve a whole solution—has
been thoroughly proven in GCA Radar,
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FIG. 70-2

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one line, but lay factors leading to the MS-760 decision.

Beech began negotiating with Martin Siskind last year. Siskind, president of M-S, was in Wichita during the negotiations.

■**CCA Link**—The company will check with Civil Aeronautics Administration early this summer on the test program it will carry out on the specimen MS-760, just before the plane's arrival in the U.S. Beech wants to get the plane to Wichita so it can run trials and gather its own data.

Bull Market Develops For Large Twins

Fewer large twin-engine transport planes will be available to competitors in coming months because local service airlines have started picking them up to meet surging traffic needs.

Anders, including Ingers, corners, are working the field for available Cessna, Cessna, Martin 2-6-2s and Douglas DC-3s, according to William C. Wolf, New York multi-engine aircraft broker. Some corporate transports, including two C-340s and some DC-3s, already have found airline markets.

The eight Martin 2-6-2s formerly owned by Pioneer Air Lines are being negotiated for by several local lines, Wolf told Aviation Week.

►**Price Going Up**—Competition for the large twins has had a bullish effect on prices. A year ago an airline or basic Douglas C-47 could be bought for \$60,000 to \$70,000, by the first of this year the price had risen to \$70,000-\$80,000 and today's asking price is from \$90,000 to \$115,000. If the market continues in this fashion, prices could climb to \$125,000 within the next 60 days, according to Wolf.

Lockheed was selling for \$85,000-\$100,000 a year ago, the company reports, with airlines asking from \$100,000 to \$125,000. Asking prices are about the same today, but asking prices are said to be lower and fewer of the planes are moving. At the start of 1955 Wolf had 75 Lockheed and 10 basic Lockheed listed, the respective figures are now 11 and 16. Wolf reports that there are 214 corporate Lockheed, 17 airline types and there are government-owned.

Wolf predicts that for the next three or four years the need for additional transport equipment by the airlines and corporations will guarantee the ability of manufacturers to furnish planes. With few Cessnas and Martins available, the DC-3, a longtime favorite of corporations, has moved into the spotlight again. But, as the DC-3 market tightens, business firms will turn more attention to the Lockheed Lodestar-class transport, Wolf believes.

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How Russian Engineering Looked To a Captured German Scientist

By Gerald W. Schneider

(McGraw-Hill World News)

DACA—The story of Prof. "Hans Schmidt" begins at the end of 1945 when he, with a large group of German scientists, was captured by the Russians in hand-delivered Berlin and confined in an empty NKVD cell.

After a few weeks of rather dismal confinement here, Prof. Schmidt and his colleagues were moved to a suburb of Berlin and began to get the Russian version of the VIP treatment. In fact, Mr. Schmidt and the children were allowed to see Prof. Schmidt and the whole family was granted an apartment in their Russian capital.

"We lived, in those days," says Prof. Schmidt, "in a golden cage." But this "golden" existence was not so hot forever; after a few weeks, the Russians suddenly descended on the Schmidt apartment one early morning and informed the professor and his family that they would leave on a train for Russia that very morning.

When Prof. Schmidt protested and told the Russians that they had promised him that he might stay in at least what is now East Germany, they told him:

"You have two choices, Prof. Schmidt: you can either go to Siberia or you can work for us in Russia. The choice is yours."

Under these circumstances, Prof. Schmidt chose the more comfortable himself and his family and embarked on the long train voyage to Russia. On Oct. 22-23, 1946, over 2,000 German engineers and scientists were moved by train to Russia in probably one of the largest mass movements of "humans" in the recent history of the civilized world.

All German scientists who have worked in Russia, and who may still be working there, were probably moved during those two days.

Arrival in Russia

After an eighty-day trip by train, under the most primitive conditions, Prof. Schmidt and a group of about 50 Germans were deposited in a little village not far from Moscow. In Prof. Schmidt's group there were roughly 15 scientists; the rest constituted wives and children.

And now began the real work in Russia for Prof. Schmidt. He and his fellow scientists were put to work on various projects given them by the Russians.

Prof. Schmidt stresses that he never signed a contract or any other written

This article is based on an extended conversation with one of Germany's top aerodynamicists. Although he now lives in the relative safety of the West, he has noted that his identity be obtained. In this case, at least, the case of the RND is still long and effective. At his request, American War has omitted all references to his activities or location that might point him to the authorities.

agreement with the Russians. "Our contract was a subconscious one," he says.

His group of 15 scientists was subdivided into three small groups of four or five German each. In each small German nucleus, roughly 30 Russian engineers were attached for study and work. In order to train the highest possible number of Russian engineers, these Russian groups of 30 were changed with great regularity.

Each project given to these groups was handled in several different stages: first, the draft stage; then, the technical project stage; last, the final presentation stage. Whatever a project was 90% completed, the entire project was reviewed by the Russians and all drawings, papers, blueprints, and whatever technical work had been performed, were turned in.

But the German scientists soon found out that it was at this stage that the real work on the project was begun by separate Russian groups who might exist at a great distance from the location of the original German pilot groups.

It is also interesting to note that several German groups, sometimes at far distant locations, would be put to work on the same project by the Russians.

Prof. Schmidt says "The Russians would play one German group against another. Sometimes they would come to it with representations or our own work which was undoubtedly and born out by another German group located at some distance from our village."

Each German project was, of course, closely followed on a parallel course by a Russian group composed of top scientists, supported by practically unlimited funds.

The German scientists were paid roughly 1,500 rubles monthly, but some salaries were as high as 5,000 rubles and a few brilliant German scientists received 8,000 rubles. Oddly enough,

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all salaries to German scientists were reduced sharply in 1947. In most cases, they were cut in half, some were reduced even more.

Random Walks Dead

Almost seven years of experience in working with the Rammann has left Paul Schmidt with a deep and apparently lasting respect for Rammann workmanship and efficiency. Observers frequently call attention to the fact that Rammann goods for civilian consumption, such as iron, tinners, refrigerators and cars, show positive and sometimes splendid workmanship.

Prof. Schmidt warns that the state of affairs is certainly not true in the military sector. "The Russians marched in who worked with us during those years were really topflight," he says. "I wish we had a few of them in the West."

"Whatever specifications we asked for, we could always be certain that we would get those specifications without fail and on time."

Details of Schmidt's work in Russia are, of course, almost impossible to obtain. But it is known that several German groups of scientists worked on perfecting the Loris rocket powerplants in the form of a "Bying laboratory." In effect, a model engine was adapted to standard Russian artillery guns and could be fired from these guns and thus achieve the speeds previously mentioned.

The groups also claim that they achieved a 40% efficiency from fuel used. This certainly exceeds the efficiency that are accomplished by most conventional powerplants today. It only cost the Germans about 50 to adapt the concept "Ewing Laboratory" to conventional aircraft.

Thus, they claim, they achieved a cheap and effective method of perfecting the Leninist model government.

The West underestimates Russian efficiency in military technology. For example, Schmitt emphasizes that the Germans in Russia learned to build better types of military items cheaply, simply and quickly. These items nonetheless performed the job for which they were designed.

"We in the West build things on far too complicated a scale," he believes.

Schmidt refutes the limitations of Russian engineers, at the same time he has come away with a tremendous respect for Russian engineering capabilities in the field of aviation. He claims Russian engineers know 20 times as much material by heart as the average German engineer.

But the Russians are fairly low on what the West would call rebuffed suggestions. Apparently they don't play around with ideas the way most

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can engineers would. Real experience runs on the model of Edison or Diesel does not exist in Russia. Russian engineers become somewhat staid when they live, to take my real new ground. Prof. Schmidt agrees that the Western world should realize and appreciate the complex, rigorous devotion to his job on the part of the Russian engineer. The Russian engineer has tremendous ability to soak up knowledge and to learn by rote. This is aided by the fact that textbooks are extremely cheap in fact. He also has a very real sense for practical, simple solutions. On the other side of the coin, there is a cost has been charged for basic values, and machine tools fall apart literally under their loads.

"The Russian engineers tend to duplicate their own ideas," Schmidt says.

Engineers for the Future

Immense efforts are made in Russia to train huge numbers of engineers for the future.

Today there are some 17,000 technical institutes, some of these are very small, others are good-sized plants. Education at most may be somewhat out-of-date, but the Russians claim that "in 20 years we will get out 100 Golems." Education on the lower level—the high school and undergraduate level—is based very lightly by Moscow standards but at the higher ends of learning, such as the University of Moscow and Leningrad, the number best does not hold true.

Natural sciences faculties at Moscow and Leningrad Universities are completely and thoroughly trained in the traditions of European research and scientific work. They are not only well trained but cultured on Western standards as well. In German engineers they enjoyed showing off their knowledge at Goethe, Milton and Goethe. One Russian faculty member at Moscow knew the University of Göttingen well.

It is ironic that Prof. Schmidt's work on magnet powerplants was partly made ignored by the German government before and during the war. But when the Russians captured Prof. Schmidt, he found out that the Russians had watched his work for many years and were completely and thoroughly acquainted with it.

While the Russians probably educate lots of mediocre scientists, the Western World should never forget that they do have some really bright people. What probably was a top-flight Russian scientist spent most his western counterpart is the fact that he is even more highly respected than his colleague in the West. Yet the Russians train a really good physicist, they don't allow him to spend much time on subjects such as chemistry and mathematics, for example. A high degree of

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SAFETY & JOBS—Aerobic supply of skilled craftsmen speeds development in Britain, machinery speeds production in the U.S.

How U.S., British Jet Practices Differ

By David A. Anderson

What are the differences between British and American design and test requirements for jet engines?

What factors make the developmental climate healthy in Great Britain and France? What factors account for the production records of the United States manufacturers?

Should we adopt British standards to speed our engine development program?

Questions like these must be answered, in view of today's general belief that the British excel in development but it takes Americans to produce.

To answer that, few engineers from American turbojet manufacturers—rich with specific experience in connection with British or French engine development—found the nucleus of a panel discussion at the Society of Automotive Engineers' national executive meeting in New York, recently. (Discussion was reported briefly in *American Way* Apr. 15, p. 13).

How We Differ

Specific differences between British and American practice in test requirements were spelled out by H. W. Page, manager of General Electric's J47 and J79 projects. He noted that British test requirements in some cases together and in some cases less than the American requirements.

To qualify for line flight, the British run a test in a special category, running the engine for an average of 25 hr, but not necessarily at the specification rating. By contrast, the U.S. manufacturer has to meet the terms of spec MIL-E-5159A, and meet on his engine

for a minimum of 50 hr at the specification rating.

Said Page: "There is a lot to be said for the British viewpoint. Altitude tests can be done just as well after 25 hr as they can after 50."

For endurance tests, the British use a prototype engine, but it must be fitted with the flight inlet and turbine, exactly as will be used on the particular aircraft installation. During the test, the governing requirement is that the engine must be capable of continuous satisfactory operation.

American engine developers have to use a production engine for the endurance runs. They are allowed to use a benchmark, however, and flight inlet and turbine are not required. Governing equipment is that the engine must not fail or indicate weaknesses.

Page commented that it seemed the Propulsion Laboratory at Wright Air Development Center interpreted that phrase to mean that the engine must look brand-new.

■ **Test of Three-Acceptance** testing differs in Great Britain and the U.S. In Britain, the engine runs for 3 hr, 5 min, with a fuel run of 20 min. Thrust ratings are taken on an average over the first batch of 10 engines, with acceptable figures down to 4% below the type rating.

By contrast, the given run for American engines lasts 1 hr 30 min, with a fuel run of 30 min. Thrust is established on a proof test with no deviation from guaranteed rating permitted.

■ **The Roman Way**—"There is a saying on engine British engines into existence to evaluate their potential, and Arnold Ridding, chief production design, for Westinghouse Aviation Gas

Turbine Division. By contrast, in the United States the emphasis is on getting production engines into squadron service.

Actually, there is little difference between the quality of the production engines in either country.

One reason for the improved development capability in England is the skilled craftsmen, said Ridding, being his observation on his stay at Rolls-Royce, is Derby, under the terms of the Westinghouse-Rolls interchange agreement.

Although capital costs are about the same for machines and plant in both countries, the British workload is available for about one-third the salary of his U.S. counterparts, Ridding said. This has saved them a sharp, a disproportionate of manpower over machinery.

These workmen furnish a pool of skilled, enthusiastic mechanics and technicians who are able to design parts, make tools and fixtures and knock out pilot production runs, he added.

British technical personnel have a more general background of experience, having worked on many plants of development and design. In the U.S., engineers tend to become specialists—trained and to be faced into specializing on compressor design, to use an example.

Another large contributing factor to developmental speed is the supplier situation in Britain. The firms are mostly small businesses, and they tend to be more cooperative. With the exception of one quite independent firm with a "strategic" role in the development process, supplier relations with the engine manufacturers are easy.

From the engine viewpoint, the engine manufacturer has an easier time in



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Buttress because the altitude pace is slower. The engine people can take their engine after development of the engine has started. Belling said that "light" engine testbeds can change overnight according to the pace of the altitude development. If engine A is slowing down, so does work on the engine for engine A.

Typical British Program

Belling detailed the outline of a typical British engine development program for comparison with U.S. techniques.

The preliminary design phase is carried on at a high level of activity for about one month if the engine is similar to others developed by the firm, or for as long as two years if the engine is new. In contrast, here we often drop the design completely in a few months or start detailing for production.

Prototype engine design goes on at a high rate in Britain, and accounts for between one month and four months.

Detail design starts at a high level, and after about six months from the finalization of the design, a separate group is split off to start adapting the components for tests. About six months after the start of the final engine design, test rigs are running.

Prototype manufacturing takes place in the company experimental shops. All tooling for the design is made right in the test shop, and Belling cited a case where special benches were made in three weeks. "That compares to a familiar figure of six to ten months' delivery time," he added.

Control and flight testing begins immediately after about one year from the first static test. Then come the 25 hr tests, and after that, engine air is used to specific experimental airframes. Qualification tests follow.

Production lines start rolling steadily within about one to two years after the qualification tests.

◆ Additions—To these comments, Stuart Scott Hall, of the British Joint Services Museum, added that he believed the engine manufacturer was permitted financially all the way down the list, and better than in this country. But that, there are no military requirements for engines in Great Britain, instead, the overall aircraft mission and problem is stated, and the engine is part of that. The engine manufacturer may need up with a four-line specification.

Another place for the experimental shop was visited by the British representative Stanley Vicker. The British shop had built an experimental 11 stage axial-flow compressor within seven weeks from the receipt of the drawing. And in the case of the De Havilland 5 axial-flow engine, and Rolls representative Kenneth Vincent, it was only six weeks from the date of the first draw-

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ing in the time the first engine came off the line.

Get the Tech

French turbojet practice, typified by Turbomeca, was followed by Whittle's Colson, chief engineer of Continental's Con Turbine Division. Continental builds Turbomeca jet units under license from the French company.

There is similarity between British and French practice, Colson said. By one standard, there is a prototype or pilot-line product. The quantity of production is the real key to the difference in technique.

Colson called the French experts in the art of prototype development, and their rapid development translates engineering thought. He cited two specific areas of advantage to the French designers:

- **Intuitive insights**, tied to a basis for exceeding performance figures. Conservative maximum values are given as target figures for weight, thrust and specific fuel consumption, and a formula relates them to the burner.
- **Flexibility of design** steps, and even their complete absence. During the development, the firm will produce one design report for a single responsible government official, instead of the confusion that must be reported to several.
- **No need for extensive component development** before the first series of engines. Tests are done either on scale models or on single components.
- **Apparent dominance** of the engine

manufacturer, over the engine development and the military in the early stages. The latter two, according to Colson, seemed to act in almost as advisory capacity.

A firm historical footing for the present discussion was placed by G. M. Cole, of Ford & Whitley Aircraft, and Marshall Collier, of Wright Aeronautical Division. Both men spoke of specific experience in Americanizing designs.

Cole told about the changesover from the Nazis to the J48. Collier commented at length the changes that accompanied the transfer.

Windtunnel Group Names New Officers

The Aerospace Tunnel Association, a rapidly growing working-level group formed to interchange ideas, techniques and problem solutions in the field of engineering wind-tunnel testing, held its third annual meeting in Washington recently.

Eight technical sessions were featured during the two-day meeting at which Naval Ordnance Laboratory and David Taylor Model Basin were in hosts.

National organizations were represented, including three airlines firms and one aircraft engine company. Officers elected: H. M. Schwenker, Jet Propulsion Laboratory, California Institute of Technology; J. T. Tennyson, United Aircraft Corp.; A. B. Buckley, Wright Air Development Center.



Research Skeleton

The streamer skeleton, held by Eacoy's Jean Robertson, is the base on which a flexible fabric model is built. During tests with the streamer skeleton, engineers can watch the motion patterns of the big airplane. On these metal bones are long plates and fabric streamers, free to move independently. The construction structure simplifies the aerodynamic characteristics of the big plane being wind tunnel tests.

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TORNADOES

Here's helpful information for every pilot on these dangerous, spending, whirlwinds.

Watch to the West—Tornadoes are local in origin and brief in duration. They rarely travel more than 100 miles in any one direction. If they are forecast, they can be avoided by careful observation during the day.

Another safeguard which should be utilized is the Weather Bureau's "Seven Weather Factors." Using advanced techniques, they give warning of the danger areas where destructive tornadoes are likely to develop. Watch for these warnings on your weather interpretation canvas and listen for them on your radio.



When tornadoes occur, they rarely develop in the same areas of a few previous years because the cold fronted down in bursts. The weather may indicate the area of greatest danger. Near the location of the new tornado on the map above.



Although many pilots may not realize it, no modern civil aviation is possible in the United States, as the map is left alone. They are also common in many other parts of the world.

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Fact: The unit is less than 18" long, weighs under 16 pounds, heats fuel from minus 65°F to 200°F, and supplies hot fuel at the rate required as long as necessary to insure a smooth engine operation. It draws less than 7 amps, can be used while the starter is on.

This is another case in which the nameplate "Janitrol" stands for "space not or exceeded" as it does in so many aircraft heaters, gas turbine components, and combustion equipment. Write for new engineering data sheet or call your Janitrol representative.



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AVIONICS



ARC-52 TRANSCEIVER developed by Collins can conform to module specs in aircraft bays. Major plug-in units are shown at left: (1) fault B amplifier, (2) 70-50 net, (3) modulator, (4) net power supply, (5) side unit (7) guard receiver, (8) modulator, (9) spectrum analyzer, (10) receiver pre-amp, (11) power amplifier.

Modular Transceiver Cuts Space Waste

By Philip J. Kiss

The problem of squeezing growing numbers of avionics equipments into prepacked jigs has bedeviled the aircraft industry for some time.

Now Collins Radio Co. has done something about it by designing Navy BuAer's new 1,775-channel UHF transceiver, the AN/ARC-52, with a modular construction that can be packaged in a variety of shapes, or even two boxes, to conform better to available bayage space.

Collins is applying the same techniques to several other pieces of equipment, including BuAer's new Team receiver, the AN/ARC-51 (XN-10).

The new ARC-52 takes another pricing advance industry problem: scaling of avionics equipment—in response 15 lb of cooling equipment and 44.6 lb of extra engine fuel per hour to ensure 1 hr. of altitude hold in a Mach 1 airplane, Douglas Aircraft Co. says.

The challenge is more difficult in a communications unit, particularly one operating in the UHF band. Here mechanical shaft rotations must be translated between some of the radios for channel (frequency) selection.

If the full maintenance advantage of modular construction is to be retained, these "mechanical" modules must be designed for speedy replacement without special tools, fixtures, or alignment procedures.

In the ARC-52, Collins has solved this problem by automating the mechanical drive module, and the four modules in power—main RF, spectrum, IF and power amplifier—through a gear plate assembly located under the

chassis against the ARC-27 and ARC-34, 2-in. example.

Increased power output—20 watts, a better than 3-dB gain over the 5-W net output of predecessor equipments. The ARC-52 is permitted to permit operation at altitudes up to 70,000 ft without derating.

Smaller size and weight. ARC-52 is slightly smaller and lighter than the unmodularized ARC-14, and is 50% smaller and 35% lighter than the ARC-27.

Fewer tubes and tube types. The new Collins set uses only 42 tubes, removed to 75 in the ARC-14 and 55 in the ARC-27. Only 16 different tube types are employed, compared to 18 in the ARC-14.

Modular Challenge—Modular construction techniques lead themselves more easily to automation, digital computers and similar systems where only electrical interconnections are required between modules.

The challenge is more difficult in a communications unit, particularly one operating in the UHF band. Here mechanical shaft rotations must be translated between some of the radios for channel (frequency) selection. If the full maintenance advantage of modular construction is to be retained, these "mechanical" modules must be designed for speedy replacement without special tools, fixtures, or alignment procedures.

In the ARC-52, Collins has solved this problem by automating the mechanical drive module, and the four modules in power—main RF, spectrum, IF and power amplifier—through a gear plate assembly located under the

main chassis. The modules, mounted on the other side of the chassis, can rest to the gear plate assembly, via Collins-type splines which permit speedy replacement (see photo, p. 45).

Package Flexibility—This approach to the problem of modularized avionics also simplifies the problem of repackaging the ARC-52 to different form factors. The more five mechanically interconnectable modules can be repositioned in a variety of ways simply by exploring a different configuration of gear plate assembly and chassis.

There are other design challenges that result from modularization, just incidentally RF events are involved. Considerable attention must be given to circuit impedance levels of various sections between modules when the equipment is subdivided.

As with conventional construction, discretion must be used in the location of intermodulated modules relative to one another. For instance, a high-gain IF amplifier should not be located next to a power amplifier.

Individual modules can not be permitted to cause military specs for conducted and radiated interference without an input from the main equipment case and filtered conductors into the equipment, Collins points out.

Modular Design Benefits

In addition to the obvious benefits of simplified maintenance and lighter for the military, and flexible form factor for the aircraft manufacturer, there are other significant benefits to be gained from modular construction, Collins believes.

For instance, equipment can be prepa-

Whatever the job...



HO4S HOWitzer goes staff by Panambi-built Army HO4S-C Work Helicopter—the heaviest load ever carried by a Sikorsky helicopter. Initial drop carries 22 troops or 2 tons of cargo.



NOISE ON view of a Panambi-built Royal Canadian Air Force helicopter showing complete plastic enclosure, the transparency of which was protected by Permacel 70 during remounting.



PERMACEL 70 masking tape is used to mask plastic helicopter nose, usually in Panambi remounting operation. Specially treated to be highly resistant to solvents does not pit or wear the plastic.



THROUGHOUT the aviation industry there is a need for every one of the great variety of Panambi Imperon such operations as painting, bolting, staking, clamping, studding—most metal



GEAR PLATE ASSEMBLY which mechanically interconnects all driven modules in Collins ARC-12 helps give the equipment firm flexibility and ease module replacement. Gear plate assembly is shown at left; right photo shows it in installed position under chassis.



modification and/or replacement in the field merely by substituting different or improved modules. Also might include such things as changing receiver bandwidths and/or frequency stability, or connecting an AM set to FM.

Thus modular construction facilitates equipment modernization and delays obsolescence.

Modular design's advantages to the manufacturing of prime equipment include:

- **Accelerated development.** Equipment can be based over to mechanical engineers for thermal and shock design earlier in a development program. As soon as circuit engineers have established approximate size and power requirements for each module, the mechanical engineers can go to work while the electronic specialists are still in fixing their circuits.
- **Standardization.** Some modules can be applied to several equipments, giving engineering and manufacturing economies.

For example, some of the ARC-12 modules are used in a small 28-channel UHF receiver designed for detection radar use. Collins of the modules employed in Collins' new turbine AF-101 helicopter also dual use in its F-104 High-Altitude Director and MG-101 gyrocompass.

Collins not only is applying modular technology to its own military and ocean equipment, but to its commercial lines as well. The firm has established company-wide standards for module dimensions (in multiples of an acceptable unit length). Exceptions are provided if necessary, but eventually Collins expects to standardize on a few basic module sizes within the company.

Because the ARC-12 is powered, cooling takes place externally through a heat exchanger built into the equipment's case. Internal heat is transferred to the case via a metal internal blower. From here it is transferred to ambient

cooling air which is forced into a plenum chamber at the bottom of the case and exhausted from the top. Cooling air is supplied by a blower (ventilator) blowers or from a central source in the plane.

Cooling capacity is sufficient to permit ARC-12 operation to 70,000 ft without deicing. Collins says:

Circuit Highlights

Like most receivers, many of ARC-12's components and modules serve dual roles, functioning both as the receiver and transmit modes. Using only 15 crystals (50 in the transmit mode), the set provides 1,750 discrete channels in the 125 to 400-mc band.

When operated as a receiver, its tuning range is limited to an RF amplifier, tunable over the 125 to 400 mc band. The resulting signal is mixed (heterodyned) with one whose frequency is some 10-mc increment between 100 and 170 mc, depending upon the channel selected (see block diagram, p. 46).

The selected signal is obtained from one of a bank of 15 crystals whose base frequency has been doubled or tripled, then amplified in the spectrum amplifier.

• **Second Injection.** The resulting IF signal (100 to 200 mc) is amplified and fed to another section (B). A second injection signal, obtained by mixing the output from two crystals, one in the 1-mc decade and the other in the 0.1-mc decade, is then introduced to produce an intermediate frequency of 1.65 mc. This is filtered using a highly selective dual-tuned filter package, to reduce spurious responses, unneeded and thus detected.

The resultant signal is fed to an audio amplifier and associated circuits, such as automatic volume control, noise blanking, and speech.

A separate power channel section also feeds into the audio amplifier. It is a single-channel, double conversion receiver with its own AVC and speech



ARC-12 CONTROL HEAD gives themselves flexibility by permitting selection of any one of 15 preset channels, in direct tuning of all 1,750 UHF channels.



MODULAR CONSTRUCTION, a company's policy, at Collins Radio Co., is employed in its new radome antenna pilot amplifier. The unit includes computing and control modules that incorporate transistor-coupled amplifier circuitry.

circuit. The ARC-12 has provision for prelight selection of any 70 channels which can be tuned in later by the pilot by means of a rotary select switch.

• **As a Transmitter.** When the ARC-12 is operated as a transmitter, channel selection works in a fashion similar to the receive mode. The carrier frequency starts out as a 1.65-mc signal

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and uniform drift rate. Over drift rate is quoted at less than 0.25 deg./sec. Added benefit is lower cost.

The gyro is designed for 315 v., three phase, 400 cps. operation. It has 360 deg. of freedom about roll axis and 360 deg. in pitch. Excitation rate is variable between 0.5 and 1 deg./min. Excitation pulses maintain gyro spin rate slightly within 1/16 degree when free of external acceleration, maintenance may. Gyro wheel momentum is 8.0×10^6 gms cm²/sec.

Manufacturer: Lear, Inc., Dept. 33, 120 Iowa Ave., N.W., Grand Rapids 1, Mich.

Directional reference, Model 45/100, reportedly has a Scramble test drift rate under 6 deg./hour (inclosure of earth's rotation). Under 180 deg. rotation up to 2,000 cps, drift rate reported is under 50 deg./hour. The Model 45/100 is presently available, mounted on a hermetically sealed case measuring 5 in. dia x 3 1/2 in. long, weight 3 1/2 lbs. Gyro motor operates from 115 v., 400-cps source. Test unit has +65 deg. of freedom, and provision is made for non-oscillating both axes.

Manufacturer: Gyrocompass, Inc., Rahway, N. Y.

Kate gyro, a low-cost, hermetically sealed and measuring 1 1/2 in. dia x 1 1/2 in. (including mounting bracket) and weighing only 0.5 lb., develops an angular momentum of 4.0×10^6 gms cm²/sec. Drifting rates of 0.2 to

60 in./deg. in long, weight 79 lb.

For application data, write to manufacturer: Automatic Controls Division, Gray McPherson Corp., San Gabriel, Calif.

Kate gyro, Model 18125, dual-damped, has angular momentum of 1.7×10^6 gms cm²/sec, measures 2 in. dia x 2 7/8 in., weighs less than 1 1/2 lb., that operates from three-phase 400-cps power, is available with a variety of accessories, damping tubes, and pellets.

Manufacturer: G. M. Gossens & Co., Inc., 210 E. Green St., Pasadena 1, Calif.

New Transducers Cover Wide Range

A new pressure transducer whose output is an easily changed non-linear function of pressure is one of several recently announced transducers.

The new Type 11100 consists of a bellows driving a tapered potentiometer with a resistor load to which as many as ten precision resistors may be connected to any of the ten tap taps. The unit's operating range is 3.45 to 30.16 in. of mercury (1-800 to 25,000 0.2-in. Hg) instrumented reportedly across MIL-5772 environmental requirements.

Manufacturer: Tru-Square, Inc., Bedford Airport, Bedford, Mass.

Other new transducers include:

High frequency pressure pickup, for measuring gas and absolute pressure in the 1,000, 2,000, 3,000 and 5,000 psi range, provides potentiometer-type signal outputs. Natural frequency is above 20 kc. Linearity deviation is less than 1% of full-scale output, according to manufacturer. Output is 20 mv/psi over entire, full-scale with 5-v. dc or ac excitation. Bulletin 1541 and 1573 give application data.

Manufacturer: Consolidated Engineering Corp., 309 N. 30th Street, Milwaukee, Wis., 53211, Calif.

Air-flow differential pressure, dual element type, for use in expendable measurement, covers the range of 4 to 580 knots over absolute range of -1,000 to 20,000 ft. is a typical application. Independent static and total pressure signals are brought out. Unit measures approximately 3 1/2 in. x 1 1/2 in. x 1 1/2 in., weighs 1.5 lb.

Manufacturer: Technology Instrument Corp., Acton, Mass.

Aerocorometer, Model 662A, designed to provide stable characteristics over temperature range of -65F to 200F, has damping time which is adjustable between 0.1 and 1.0 seconds over range up to 200 and 100 in. respectively quoted at 9.5 to 1.0 in., with resolution of 0.25 in. or 0.5 in. Unit measures 1 1/2 in. dia x 1 1/2 in. long, weighs 5 oz.

Manufacturer: Donau Laboratories, 6115 Magnolia Ave., Riverside, Calif.



MODEL A 510 spectrometer in 540,000 mcg, withstands 30,000 without damage.

Model A 510 provides better accuracy and temperature stability than pure bromine trioxide. It measures 1 1/2 in. dia x 1 1/2 in. long, weight 1 1/2 lb.

Manufacturer: Gishen Mfg. Corp., Meriden, N. J.

Makers Report New Microwave Devices

A new low-loss X-band reflex klystron for use in airborne radar and laser systems is one of several recently announced microwave devices.

The new VA-185 Klystron, weighing only 8 oz., reportedly has exceptionally good frequency stability and can withstand 50,000 shocks without malfunction or damage. Complete specs may be obtained from the Applied Research Engineering Dept., Vero Associates, 731 Illinois Way, Palo Alto 2, Calif.

Other new microwave devices include:

Radial wire-grid bulkhead assembly, for use with either X- or C-band radar, features a circular plate which can be used to bulk waveguide to airplane bulkhead. A rubber gasket provides an airtight seal. VSWR is quoted at 1.05 maximum.

Manufacturer: Artron, Inc., Dept. A, 1181 West Elizabeth Ave., London, N. J.

Rotary joint, available in K, N and S bands, reportedly provides VSWR of less than 1.10 over operating frequency range. Peak power without penetration is 30 kw for K band, 175 kw. for S band and 1,700 kw. for S band.

Manufacturer: Instrument Corp., 215 E. 91st St., New York 23, N. Y.

Silicon etched diode, Type IN216, in a broad-band mixed point-contact type designed for use as a crystal mixer at the frequencies of 16 to 20 kHz.

Manufacturer: Schottky Electric Prod-

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161-162, Electronics Division, Woburn, Mass.

• **High Power Solid State "E" Amplifier** by Hughes Aircraft Co., covering the frequency range of 1.5 to 9.6 Mc., typically has a VSWR of 1.32 or less for all arm. Isolation between parallel arms is at least 28 db, 40 db between perpendicular arms according to manufacturer. Peak power rating is 250 kw. A special model has slightly greater isolation and lower VSWR.

Manufacturer: Microwave Development Laboratories, 92 Broad St., Boston Park, Mass.

• **EC Band Tracking Wave Tube Amplifier**, operating at 4 to 5 Mc., reportedly has a 30 db. small signal gain and a maximum power output of 10 watts.



HUGHES tracking wave tube amplifier.

with. The tube requires a 100 gram load and a 750 v. regulated power supply.

Manufacturer: Hughes Laboratories, Inc., 711 Hamilton Ave., Menlo Park, Calif.

Avionics Bulletins

Recent avionic bulletins and literature of interest to the avionics field include:

• **Radio receiver module and accessories** for use with fixed or airborne systems are described in GEA-4275 (11 pp.). General Electric, 1000 Main St., Schenectady 5, N. Y.

• **Measurement studies** include GEA-4276, which contains a variety of types of measurement. Manufacturer: General Electric, 1000 Main St., Schenectady 5, N. Y.

• **Waveguide amplifier** having 100 db gain, includes description of the design and construction of the waveguide amplifier. Written by Raymond P. Smith, GE, 1000 Main St., Schenectady 5, N. Y.

• **Design of waveguide amplifier** for constant field and constant area pressure waveguide is described in GEA-4277 (11 pp.). General Electric, 1000 Main St., Schenectady 5, N. Y.

• **Field test report** by Radio Research Laboratories, Inc. (11 pp.) describes operation and evaluation for radio control and design of constant inductance in non-reciprocal systems. Manufacturer: Radio Research Laboratories, Inc., 1000 Main St., Schenectady 5, N. Y.

• **Waveguide amplifier** includes a description of the design and construction of the waveguide amplifier. Written by Raymond P. Smith, GE, 1000 Main St., Schenectady 5, N. Y.

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AN5540-2 Iron-Constantan spring-mounted type with copper wire and supporting bracket, size standard steel and stainless steel are provided with flexible braided-lead sheathing. AN5540-3 terminals are soldered to leads.

AN5540-1 Iron-Constantan spring-mounted type thermocouple with junction located in a protective spring with which this thermocouple will retain its strength despite high temperatures.

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CHIEF PROJECT ENGINEER Harvey J. Brown (seated), Ryan Industries, Inc., Embell, discusses new G.E. motor for Ryan Industries' intercompter directed disseminator with G.E. Sales Engineer Hugh Tidson.

G.E. develops a versatile new aircraft motor to meet rigid specs of Ryan Industries, Inc.

"Recently we required an aircraft motor of extreme versatility to meet radio-tele-thermal, explosion-proof, and other arbitrary specifications on an intercompter directed disseminator we are developing," says Chief Project Engineer Harvey J. Brown of Ryan Industries, Inc. "We took our problem to General Electric because of their proved ability to produce prototype and production models to meet our tight schedules."

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PUBLICATION GEA-4136, "Operation Service," describes the six point program in detail. For a copy, contact a G-E Aircraft Specialist via your nearest G-E Aircraft Sales Office. Or write Section J32-A, General Electric Company, Schenectady 4, N. Y.

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EQUIPMENT

Auxiliary Jet Power Poses Problems

By George L. Christman

Fast-growing demands for auxiliary power in modern aircraft are complicating the equipment designer's life. Military aircraft speeds are already such that the human pilot is incapable of "weapon delivery" without the aid of electronic eyes and a too weak to control his plane without hydraulic systems. Auxiliary systems must provide the power for these aids.

The Auxiliary Power Source panel during the Society of Automotive Engineers' annual New York meeting took up the problem of how this power might be supplied.

Three Kinds of Power

• **Electricity.** An auxiliary engine can produce a new and separate source of a power for aircraft because a frequency for new engine equipment on the aircraft has to be held in order to fly. If a plane's main electrical system, with power ranging from 40 to 240 kw, has to be very tightly regulated, it is a major task, the panelist said.

A separate air source for the main engine system suits whose power demands are relatively modest 2 to 4 kw, and provide enough job of close frequency control.

• **Hydraulic.** Used as the hydraulic fluid is to split a plane's ability hydraulic system—operation of landing gear, flaps, speed brakes, etc.—from the dual power control system used to activate flight control surfaces. In a dual hydraulic pump-and-rod is indicated.

• **Pneumatic.** A panelist pointed out that compressors bleed air is rapidly getting too hot to handle. A compressing factor is that modern military powerplants are bleed air by synthetic air which can leak past engine seals and compromise the bleed air. Therefore pneumatic engines now have to run as an engine-driven pneumatic pump, requiring still another pad.

• **How to Drive.** The speaker disagreed strongly over how the auxiliary power source themselves should be driven and where they should be located.

Among the points brought out:

• **Engine-drive.** This is the most popular method among the airplane makers. Navy's Bureau of Aeronautics has called a letter to investigate possibility of achieving zero-draw in how to drive accessories and to discuss which source should be powered electrically.



137 ACCESSORIES jet engine mounted (above); but military from remote mounting

Individually and progressively. One of 10 auxiliary components, eight came out for electric-driven, engine-mounted units. Such as installation in light and simple, they said.

Opposed were the engine-mounted units. People objected that there is no longer room to mount a kind of accessories on jet engines, particularly because higher speeds mean engines must have smaller frontal area, and the smaller engines cannot handle with accessories.

Another objection, agreed on by all panelist engineers present, was that engine mounting of auxiliary equipment is not suitable—such as engine maintenance has its own idea of how many and what type of accessories drive past the waste—due to even lack of contact area at a single point making different models of aircraft using the same engine.

The auxiliary system objected that engine changes are more difficult when accessories are engine-mounted, because powerplants have to be stripped of the units when removed from the plane, then built up again prior to re-installation of the engine. Also, one of accessory pads on the engine leads to many different models of a single basic powerplant, greatly complicating logistics problems.

• **Remotely driven.** One panelist engineer came out strongly in favor of remote, locating the accessories and powering them through belt-made mechanical drives. Such drives provide a great installation flexibility, since the engine unit has to provide only a basic means of power drive on which the plant manufacturer can mount any accessory drive he wants. However, the remote transmitters called such a method undesirable because it is heavy, space-consuming and too complex mechanically.

The most seriously suggested drive for remote installation are the mechanical drive at powerplant. The first two were broad out by products to being too heavy.

The auxiliary (remote) generator, because it is light enough to be pushed, they said. They noted that remote drive is itself a desirable because engine changes are simplified, in case he performed more rapidly. Logistics are eased, since the aircraft, not the engine, carries the accessories, not powerplant type can be installed in various planes. This is of growing importance at the Air Force seeks to supply more and more of its needs by air.

Other features of remote powerplant drive cited by the Air Force attendees were: be installed on the ground by plugging in an outside source of pneumatic power instead of having to run the engine; loss of a powerplant in flight does not mean loss of auxiliary power for a multi-engine plane, since bleed air for accessories is ducted from off engine.

Engine makers objected that such a plan bleeds their powerplant to death. Also, that bleeding compressor air cools four times as much as bleed air in use of mechanical drives.

This argument was seconded by the remote people who brought up the additional objection of piping complexity between engine and accessories.

Consensus appeared to be that used

Bled or Shafted?

Comparison of the jet engine accessories, aspects of methods of supplying power for accessory drive.

"What we lay down a new engine will remote power will tell us only as the game whether we are going to be bled to death or shafted to death."

is still between engine-mounted accessories for buried powerplants, although engine light may change this.

Time for Standardization

The engine maker has to design an engine with the greatest possible installation flexibility, at the same time allowing design to stabilize quickly so production may proceed. It cannot re-engineers change after the engine's development is well along, since changes will result in serious engine production delays.

A Wright Automotive spokesman said, "We would rather develop an engineering design to developing new engine models instead of adjusting it through making more variants of our engine to adapt it to many different installations."

Another specialist worried it may be too late. "Arriving at standardization is the necessary adjustment of approved rules first as an undetermined period of time—and that time is getting shorter and shorter as we get more intensive and the planes we produce go faster and higher."

► **The Heat's On**—The increased existence of so-called Mach 2 aircraft whose stagnation temperature will be approximately 235F was called to the plane's attention.

Aerometers, to operate successfully in such areas, must be designed and made of materials which will be capable of appreciably higher continuous operating temperatures than those in use today. This applies to such aircraft components—Drings and seals, hydraulic fluid, electrical insulation, hydraulic and pneumatic pumps and solenoids,

gaskets, alternators and motors.

Some such high temperature components are already on the horizon, the panel was told.

Gilfillan Pump Rights To Houdaille-Hershey

Manufacturing and sales rights to the Gilfillan van-flow high pressure pump for operating hydraulic equipment in aircraft have been acquired by the Houdaille-Hershey Corp., Detroit, Mich., through a contract with Gilfillan Bros., Inc., Los Angeles, Calif.

The pump delivers pressures up to 1,600 lb., and embeds a lock-in inlet overhanger which enables the hose pump to function with the same efficiency at high altitudes as at low level. A dual pressure control is available which enables the pump to operate at extremely low mechanical loads, conserving horsepower and prolonging service life.

The two companies will work together to further progress on the project.

Pressure Valve Keeps Emergency Line Full

New Vickers flow-sensitive pressure regulator ensures that plane's emergency hydraulic system will be supplied with fluid as long as the emergency run-in turbine is turning.

The run-in turbine is designed to provide maximum torque output at a given airflow. Usually, when suspended and engine derated, its charge approach to landing, torque produced by turbine decreases, and the pump it drives may

still if it has to operate against a pressure relief valve set at a fixed 1,000 psi. But the flow sensitive regulator senses reduced torque in terms of reduced fluid flow, and lowers relief valve setting accordingly. This eliminates likelihood of pump stalling.

Vickers says the new regulator is going into series of the "Century" series of lightest and the McDonnell F3H Phantom.

The valve is used with a constant displacement hydraulic pump. It directs all or part of the pump's output to the hydraulic system, with automatic fluid being metered off through the valve's return port.

Primer Heats Fuel for Cold Piston Engines

New piston engine primer unit debuts 235F fuel to cold powerplants, enabling them to be started in 1 min. in -65F temperatures, according to General Aircraft Automotive Division. It has been tested in a Wright R380E.

The primer, mounted between the carburetor and cylinders, in series with the standard primer, uses Venturi's "whirling flame" principle.

Unit automatically actuates the engine starter when fuel temperature reaches 235F and turns off when fuel reaches 235F.

It holds less than half a pint of fuel at a time and passes a gallon a minute. Dual solenoid fuel valves and thermal switches provide a margin of safety.

The primer is 10 in. long, 4 in. high, its total normal draw is less than 9 amp., it weighs 15.8 lb., is 17.6 in. long and 4.7 in. in diameter.

OFF THE LINE

De Haveland Propellers, Ltd.'s hydraulic pitch lock has flow about 90,000 lb. on D1H propellers. The safety device instantly locks blades made in case of any failure that might allow blades to swing to flat pitch and cause engine to overtemp.

Growing trend in hydraulic valves is to use precision lapped moving parts instead of dynamic seals to prevent leakage past the parts, according to Vickers, Inc. "Variable friction caused by seals makes correct valve operation difficult to control. Also, deterioration of dynamic seals due to corrosion and heat is a problem."

Engine test contract for McDonnell's supersonic F100 Voodoo has been awarded to Walter Aircraft Co., Burbank, Calif.



Prefab Silencer Hushes Jet Test Noise

Prefabricated acoustic tube system for lowering noise of jet engine under test reduces field installation costs and can be used to meet local requirements. Series shown consists of prefabricated concrete and steel demountable parts. Progressive stages contain structure is needed to quiet larger powerplants as provide a higher degree of noise absorption, depending upon proximity of test area to inhabited areas. Units were designed by General Sound Control, Inc., Los Angeles 78, Calif.



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Jet development tames flaming saucers...to squeeze more energy from fuel

Making flame do tricks—like taking the shape of a fan, stationary saucer—is part of the jet engine research at Westinghouse. By putting flame through its paces, engineers learn how to maintain life in a small space to liberate the most energy . . . develop smaller, more efficient combustion chambers and afterburners. Specialists meet frequently to discuss combustion problems and direct effort along the most productive lines.

This flame research—one of a broadened avenue of aviation gas turbine development—is typical of Westinghouse corporate capability. Metallurgists investigate new heat-resisting alloys; casting engineers develop new precision methods and chemists work on new fuels and lubricants.

These projects are just some of the new things going on at the Westinghouse Aviation Gas Turbine Division. They are all part of our program of jet engine development for commercial, military and marine use. All-out research and development is a Westinghouse contribution to turbojet design that is aimed at helping you bring tomorrow's aircraft . . . One Step Closer.

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Flying flat beds like this B-45 bomber are used to test new designs in the air. Flight testing is the ultimate proof of the value of a new design.



These two development engineers are evaluating a new fuel nozzle. The equipment in the background is designed to test the performance of fuel systems.



This is Allen U. Marketing your Aviation Gas Turbine sales engineer at the Dayton, Ohio, area. He is THE MAN WITH THE FACTS. Contact Al or his counterpart in your area. See FACTS on Westinghouse and North-Royce engines and designs for write to Westinghouse, P. O. Box 284, Kansas City, Mo.

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Here is the Boeing 707 soaring over Mt. Rushmore on one of its early test runs. This splendid new jet has been ordered into quantity production by the USAF as its new standard tanker-transport.



Pittsburgh laminated NESA Glass with a metal insert Plexen® edge was used in the windshield of the Boeing 707 to prevent icing and fogging. Our Technical Representatives worked closely with the Boeing Airplane Company to perfect the glazing design for the new jet transport.

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Navy Contracts

Contracts recently announced by the Navy's Aviation Supply Office, 790 Robbins Ave., Philadelphia 13, are:

Alpine Tanager Corp., 204 Duane St., Brooklyn 31, contract \$113,116 for *Carriage & Traveler* equipment, 20 E. 17th St., New York, New York, \$1,000,000, 10/1/60.

Benjamin Alpert Co., Inc., 5515 Ocean Park Blvd., Santa Monica, Calif., contract for maintenance, 20 E. 17th St., New York, New York, \$1,000,000, 10/1/60.

High-Power Co., 4400 Broadway, New York 17, contract \$113,116 for *Carriage & Traveler* equipment, 20 E. 17th St., New York, New York, \$1,000,000, 10/1/60.

Ward & Ward & Sons Inc., 125 W. 42nd St., New York 36, contract \$113,116 for *Carriage & Traveler* equipment, 20 E. 17th St., New York, New York, \$1,000,000, 10/1/60.

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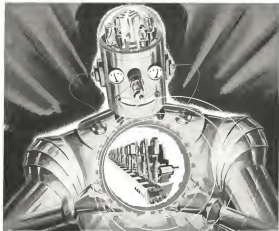
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Testing machines guide covers broad range of equipment, instruments and accessories. Bulletin BG-14-15, Machine Testing Machines Division, American Machine & Metals, Inc., E. Mohon, Ill.
Blinks, tools and sockets are described in V.R. Colgate Catalog, Vicoletto Romat Corp., Waukegan, Ill.

Stations cups and plugs for protecting, soaking or treating tubing, fittings, valves, brasslike components and related parts, Catalog 551, Rex A. Schaefer & Co., 1000 E. Grand Blvd., Detroit 2, Mich.
"The Helicopter Goes to Town," a film of an urban's emergency operations, Schenck Belgian World Services, 725 Fifth Ave., New York 19, N.Y.

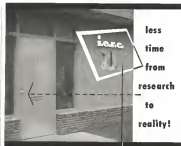
Aviation extension, sheet and plate and wire, and bar tubing and pipe list, Catalog Dept., Pioneer Aluminum Supply Co., 5230 W. Imperial Highway, Los Angeles 45, Calif.
Preservative Maintenance Manual for V-Belt Drives, Elastom Rubber Co., Dayton, Ohio

Work holding equipment and up and before components, Catalog 100, Jorgensen Tool Specialty Co., 312 E. 163rd St., Cleveland, Ohio
Precision engineering and hole-type gear blocks, rods and targets, catalog, Catalog Dept. A-9, Fowler Corp., Stamford, Conn.
Facilities for sheet and plate fabrication, welding, angle rolling, bending, punching, machining, shearing and laser cutting, booklet, National Welding & Manufacturing Co., Newburgh, Conn.



Hoisting Honest John

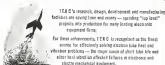
Army's ballistic rocket Honest John is shown preparing to be test-fired from a launching ramp. For field use with artillery batteries, Honest John is fired from a track-mounted mobile launcher. The Douglas Aircraft Co. unit is powered by a J46 turbojet engine, having a 50,000-lb. thrust.



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CAB Report on Extensive Plane Crash

Engine Failure Downs Private B-34

LOCKHEED VENTURA, N. 49M,
GENERAL MITCHELL, FIELD,
GILMANVILLE, WIS. DEC. 17, 1954

THE ACCIDENT

A Lockheed Model B-34 Ventura, N. 49M, owned and operated by the Miller Brewing Co., Milwaukee, crashed approximately 5,500 ft. south of General Mitchell Field, Milwaukee, Dec. 17, 1954, at approximately 1700. The four occupants were killed and the aircraft was destroyed by ground impact and subsequent fire.

HISTORY OF THE FLIGHT

Lockheed Ventura N. 49M took off from Remson I. 3,095 deg. (approx.) at General Mitchell Field, Milwaukee, at approximately 1700 for an ATR (instrument flight rules) flight to Wisconsin, Canada.

Aboard were Pilot Joseph Landi, Captain Paul Rand, and two passengers—Paul Miller, Sr., president of the Miller Brewing Co., and his son, David Miller, Jr.

At N. 49M was flying over the northern boundary of the airport after an approach

normal descent, the Mitchell Field Tower Controller received the message as to "go in for fuel and making a complete landing."

The controller acknowledged the message and the pilot reported everything about an engine problem.

The aircraft which had started a turn to the left at this time, was cleared to return to the airport and one way runway. The pilot then reported an engine problem. At this time, the controller, having no other light in the highest intensity, personnel in the tower observed a descending mass of flame just north of the field. The aircraft had crashed in a nose-down right wing-low attitude in an open field approximately 5,500 ft. north of the airport and west of a proposed line of Runway 1.

One of large magnitude occurred after ground impact and continued for several hours before it was completely extinguished.

INVESTIGATION

Impact occurred in an open field, 5,500 ft. north of the northern boundary of the airport and 26 deg. to the left of a proposed line of Runway 1 where the ground level is strictly less than 90 ft. higher than the

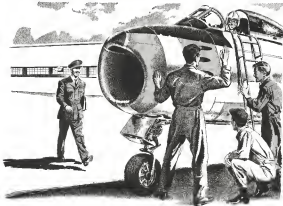
airport. The highest altitude observed by the flight, which was not more than a minute or so duration, is estimated at 5,000 to 6,000 ft. by ground observation.

The 1710 weather observation at the U. S. Weather Bureau station at Mitchell Field was recorded as follows: 5,000 ft., moment, 100 ft. below, visibility 11 mi., light rain, very light snow, moderate fog, temperature 15, dewpoint 10, and wind 7 mi., calm, gusty.

Flight instructor mentioned the Mitchell Field was 300 ft. and one mile. The purpose of the flight was to transport Paul Miller, Sr., and his son to Canada for a construction building and housing trip. Because of engine trouble conditions Pilot Landi had received a short trip to North Bend, Ind., the morning of Dec. 17 and the aircraft remained at Mitchell Field until the start of the subject flight. The one-way trip had been "hopped" on the preceding day and the two landing tanks were filled to capacity on Dec. 17 after the South Bend flight was completed. The gross weight of N. 49M at the time of take-off was between 27,000 lb., with five other maximum gross weight of 31,000 lb.

The Miller Brewing Co. maintained a well-appointed garage located at General Mitchell Field and owned two aircraft—the Lockheed involved in this accident and a Cessna 440. Pilot Joseph Landi had been employed as a pilot and in charge of the aviation department since 1947. The brother, Captain Paul Landi, has been employed by the Miller Brewing Co. since his sons. Lockheed N. 49M had been flown to all parts of the United States for periods of 250 to 300 hours during 1954. Each

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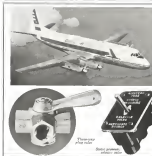


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1955



KOHLER PRECISION CONTROLS used in new turbo-prop airplanes

Vickers has selected Kohler Precision Controls for the new Viscount, first turbo-prop airplane to fly scheduled routes by Capital Airlines in United States. Kohler three-way plug valves serve the fuel systems, and the electronic selector valve operates the air-speed indicator.

Kohler Co. is a leading supplier to manufacturers of commercial, military and private aircraft, and jet engines. Facilities for forging, casting, machining and welding are maintained in one plant. Controls are developed to specifications for volume production. Write for booklet.

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plants were engaged in courses to increase productivity and there was no expense spared, so far as it could be sustained, in the maintenance and upkeep of the aircraft as home base.

It is known definitely that the aircraft was on a maintenance course just prior to ground arrest. However, the ground arrestment of the right wing leading edge indicator that had the plate been level (and not off, rather than positively level), the landing would have been about 30 degrees or approximately 90 degrees to the right of the aerodynamic course.

Examination of the remaining portion of the reference did not reveal any evidence of structural failure or control surface having been in service. Testimony of the witnesses stated the aircraft was not in the air for some 10 minutes.

Examination of both propellers revealed the same position as subject, in respect to blade angle, to be approximately 30 deg with the rotation gear key against the low pitch stop. From examination of the blade shear planes, the angle of both propellers indicated a blade angle of approximately 30 deg. There was no evidence of, when this aircraft propeller operation prior to ground arrest and no indication of propeller failure.

Extensive examination of the entire left engine assembly revealed a fatigue failure in the crankshaft at the rear armature counterweight shear in the area of the crankshaft belt. The motion of the fatigue fracture originated in the left belt flange edge of the rear counterweight bolt and the progression has extended approximately 15% through the crankshaft before its ultimate failure took place. The failure resulted in complete destruction of the counterweight and piston assemblies of the rear power section.

Extensive examination of the right engine assembly indicated all parts were in the normal, and there was no indication of excessive operating temperatures, or oil lubrication, or any other indication of failure. The failure of the propeller shaft, revealed that all parts and accompanying parts from the rear section to the rear main compartment were operating normally.

Examination of the third component of the right engine (crankshaft and differential) revealed no STCA revealed that the No. 3 crankshaft cover had a hole, approximately one-half inch in diameter, and two were present made by rubbing of the propeller governor control cable which is normally used to the propeller. Each rubbing of the propeller revealed failure on both ends due to a considerable amount of wear being present in the bearing, however, the propeller bearing assemblies were normal, with no evidence of point contact or burning.

All ground arrest both engines had stopped from the aerodynamic force and were subjected to the interior pressure for that contained approximately 15% of the reference in well as all of both engines were within 10 to 15 and including the rear main compartment. All final evidence on both engines revealed severe damage from ground arrest.

A copy of the investigation findings

Cutler-Hammer Sealed Lever Switches for Aircraft

Another contribution to aviation
progress by the engineers with a
record of "firsts" in electrical
control for aircraft

For 35 years Cutler-Hammer has been the major supplier of electrical control equipment designed exclusively for aircraft use. An aircraft program revealed the need for better control.

Cutler-Hammer has continuously pioneered in the design that have established the industry's standards. And now Cutler-Hammer leads again... with the first complete line of sealed lever aircraft switches. Designed to prevent the entrance of dust and sand, they are equally effective in stopping the entry of water even during periods of switch operation.

With a durable aluminum rubber seal, these switches meet all requirements of MIL-8-0745 and/or JAN-8-23... and, in addition, meet the seal and dust requirements specified under Procedure 1 of MIL-8-5075. These switches also meet the recommendations made in the "Report of Advisory Staff for Aircraft Electrical Systems." For complete data, write for your copy of Publication KSP-35, CUTLER-HAMMER, Inc., 1471 St. Paul Avenue, Milwaukee 1, Wisconsin.

Typical Cutler-Hammer Sealed Lever Aircraft Switches



AN-801-1 1/2" STAMP
ON Indicator 4000
X-10 Double throw,
double throw switch
with "off" position



AN-801-1 1/2" STAMP
ON Indicator 4000
X-10 Double throw,
single throw switch
with "off" position



What you should know
about Cutler-Hammer

Cutler-Hammer has long held the respect of the aircraft industry because this company has been part of the aircraft industry for 35 years. It has never been an opportunist supplier. It has pioneered the design others have followed. It has sought to serve, not merely sell. It has been in the forefront of all responsive activity in standardization and long-range planning. It has supplied complete lines of equipment, not merely the parts of what was and need greater the manufacturing. Today, as for the decades past, Cutler-Hammer engineers work closely with the aircraft industry's leaders... through direct planning, design and building for the future. Here is the record:

- 1929 Cutler-Hammer designed and manufactured the first line of switches ever created specifically for use in aircraft.
- 1934 Cutler-Hammer designed and manufactured the first 4-w. power relay ever created specifically for use in aircraft.
- 1941 Cutler-Hammer started development of the first environment-tight power relay for use in aircraft.
- 1953 Cutler-Hammer submitted and certified test reports on the first hermetically sealed power relay to WADC and the Navy. Cutler-Hammer configuration adopted as industry standard by AGC.



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Chicago, Illinois 60611.

they did not see any signs of fear in the
fox. One of the three controllers in the
tower, and another against during test
and south around blocks of whom the test
did succeed, stated that there were signs
of light, as a streak of flame rising high
from the engine area. The first of three
radio transmissions from the fox, after
becoming airborne, also stated "an engine
on fire." However, a longer Air Force
pilot and one of the three witnesses said
the power of impact gave positive indica-
tion that there was no visible fire or flame
on the aircraft in flight.

The flame-ignited parts of the aircraft
when examined, gave indication of ground
fire only, with the flames rising vertically.
There were no fire and all three studies
in detail that indicated a fire in flight.

The completely burned-out engine area
presented the same situation of maximum
indication of the heat of ground impact.
Examination of the engine revealed that
at the time of the accident the landing
gear and wing flap were fully extended.
The radio time table was at a 10-day
interval. The aircraft was in a 10-day
interval, a non-down setting.

ANALYSIS

From testimony of witnesses and an
examination of the engine, it is apparent
that a million ounces of power from the
left engine occurred soon after the aircraft
became airborne in a normal takeoff. The
action of the structural fabric in the left
engine could prevent windmilling of the
left propeller. Several ground witnesses
stated they heard quivering noise in the
aircraft passed overhead north of the airport
boundary. These quivering noise could
be attributed to the action of the engine.

There were also witness statements to
the effect that the high propeller was turn-
ing slowly. It is possible that there was
additional noise in the left engine
subjects in more engine explosion, at
though this engine may have been into
ground when the accident. Any reduction
of power would have resulted in the engine
of that class rated power from the right
engine and allowed long-range performance
more slowly.

The Military Technical Order (MTO) 100-1000
1) Manual testing the operation of the
engine (also known as the engine) is
collected against all 177 mph and gross
weight does not exceed 27,000 lb—flight
may be continued. However, there may
be made to prevent the engine from oper-
ating normally. Do not use the engine
Mantle all parts possible while holding
a straight course. If flight is continued
toward the landing gear, the engine
time table and then further the engine
propeller.

The gross weight of N 1000 at the start
of this flight has been computed as 27,000
lb (790 lb) and the 27,000 lb (790 lb) as
the engine (propeller) and because
of the short time element, reduction of the
gross weight was necessary.

The record of Capt. Joseph Ladd said
that a well-known and experienced pilot
with ample experience in flying N 1000.
It is reasonable to assume that an indicated
weight of 177 mph had been attained.

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at the time of passing over the boundary of the airport. It was in this immediate area that the failure of the left engine occurred. The ground level was south of the airport and there is also a high thrust power loss warning and red warning less than a mile south of the airport. A necessary left turn to return to the airport, with the left propeller windmilling, would seriously affect the single-engine performance. This, coupled with the possible engine power reduction on the right engine, would have caused the pilot's distraction.

Three difficulties continued to a point where flight was no longer possible. In part marks from a nose-down, right wing low ground contact from the estimated flight altitude of 50-75 ft. indicate a loss of flying speed and falling off on the right wing at the final stage of the flight. The movement is substantiated by the heading of the ground marks being approximately 90 deg to the right of the observed south-south course.

There may have been a considerable psycho-technical display streamlining back during the left rupture release. This would be due to probable capture of monoidal irregularities, king, etc., and would account for the two situations who observed unusual light or fix effects on the screen while it was still in light. However, the great majority of investigators, and this includes those across the point of rupture, are of the opinion that there was no streamlining in light. It is also possible that the pilot had a poor forecasting indication that prompted him to avoid a fix in the hour.

DISCUSSION

On the basis of all available evidence, the Board finds that:

1. The aircraft and the crew were properly certificated.
2. The aircraft was properly loaded with respect to maximum gross weight and center of gravity limits.
3. A structural failure and total power loss in the left engine occurred shortly after the aircraft became airborne.
4. A power loss during the right engine prevented normal single-engine performance.

§ The tugs and obstructions did not prevent a straight ahead emergency landing.

The left turn and loss of power produced loss of control and control that resulted in an uncontrolled crash.

TABLE 4 (Contd.)

The Board determines that the probable cause of this accident was the failure of the left engine, together with a reduction of power in the right engine following this oil, which prevented normal single-engine performance.

This condition together with the fact that the aircraft was overloaded for weight engine performance resulted in loss of control.

By the Civil Accounting Board

for Ross Wiley
for Chas. Gentry
for Hanson D. Green
for Josh Lee
for Joseph P. Adams

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FINANCIAL

Aircraft Industry's Profit Margins on Sales

	1981		1982		1983	
	Per-Unit Profit Margin	Per-Unit Profit Margin	Per-Unit Profit Margin	Per-Unit Profit Margin	Per-Unit Profit Margin	Per-Unit Profit Margin
Boeing	2.7%	1.9%	2%	2.4%	2.4%	2.4%
Boeing	2.7%	1.9%	2%	2.4%	2.4%	2.4%
Boeing	2.7%	1.9%	2%	2.4%	2.4%	2.4%
Boeing	2.7%	1.9%	2%	2.4%	2.4%	2.4%
Boeing	2.7%	1.9%	2%	2.4%	2.4%	2.4%
Boeing	2.7%	1.9%	2%	2.4%	2.4%	2.4%
Boeing	2.7%	1.9%	2%	2.4%	2.4%	2.4%
Boeing	2.7%	1.9%	2%	2.4%	2.4%	2.4%
Boeing	2.7%	1.9%	2%	2.4%	2.4%	2.4%
Boeing	2.7%	1.9%	2%	2.4%	2.4%	2.4%

NOTES:

1. Based on 1981 sales of first three months of 1982.
2. Based on 1982 sales of first three months of 1983.
3. Based on 1983 sales of first three months of 1984.
4. Based on 1984 sales of first three months of 1985.
5. Based on 1985 sales of first three months of 1986.

Will Probers Hit Aircraft Profits?

Aircraft industry profits are likely to get a close inspection by at least two government sessions soon. Before the year is over, the Reconstruction Finance Corp. will release its report on the industry's profits and losses, and at least one congressional committee will release its report on the industry's profits.

Although reconstruction has been completed for most aircraft companies through 1951, the excellent earnings of the aircraft year have yet to see the reconstruction period. The Re-

construction Board has already accepted \$710,000,000 from the Reconstruction Finance Corp. in 1951 profits and the Reconstruction Finance Corp. is now making an independent review on its 1951 fiscal profits (AW Apr. 25, p. 95).

Evening for the aircraft industry as a group were other members, or subsidiaries, for the years up to and including 1951. It was not until 1952 that earnings started to pick up, gathering momentum in 1953, and some

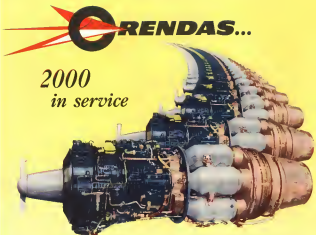
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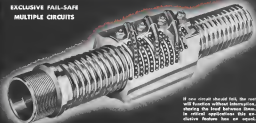
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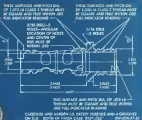
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(Continued from page 9)

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Rose Allen Mahoney F. Schmitt (FSM) Inc., director of weapons planning for General Precision Equipment Corp., Washington, D. C.

Harold G. Wakes, controller, and Howard G. French, senior lawyer, Pennell Aviation Corp., Los Angeles.

Alexander McGilberry, director of 6 units, Hughes Aircraft Co.

Buddy Wright, director of Cleveland Aero Products' new landing gear service department.

William K. Korman, advertising manager and public relations director, L. B. Smith Aircraft Corp., Miami Fla.

R. James Pfeiffer, executive director of military releases, Firehill Empire R. Aircraft Corp.

Lewis G. Swanson, procurement director, Pacific Industries Corp.

Nicholas G. Ryan, scientific consultant and researcher, Lockheed Aircraft Corp.

C. B. Wilks, director of technical operations, Delta C&S, No. 100.

Rose Whitford, public relations director and assistant to the vice president, Harding Aircraft, Ltd., Toronto, Ont.

Wendell E. Birked, engineering manager for landing gear products, Pacific Aircraft Corp.'s Products Division, South Bend, Ind.

Edwin J. Smith, chief experimental pilot, Bell Aircraft Corp.'s Helicopter Division, Fort Worth.

T. J. Dalton, sales and service manager, Meca, Inc., Miami.

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W. E. Hampton, aviation expert representative, D. Noyes & Son, Ltd., London.

Robert Land, manager of aircraft unit, Thompson Co., New Brighton, Pa.

Roy Madison, San Francisco district sales manager, Quanta Engine Aero.

Gay E. Ashby, Jr., manager of Aero, Inc., South Area Corp.'s field office at Dayton, Ohio.

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Mr. Hutz is a graduate of Northwestern University and served in the U.S. Air Force during World War II.

He was one of the organizers of the Air Force Association and served as its president for the past 12 years. He is a member of the National Aeronautics Association and the National Defense Science and Engineering Administration. He is also a member of the American Society of Mechanical Engineers and the American Society of Civil Engineers.

He is the author of "The Air Force Association" and "The Air Force Association" and is a member of the National Aeronautics Association and the National Defense Science and Engineering Administration.

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mum of 2,000 watts, provides an outlet coolant flow of 2 gpm. at temperature of 185°F. Fluid is Monomote OS 45.

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Maximum coolant pressure of 110 psi is controlled by a bypass valve. Other components include heat exchanger, thermal switches, flow switches, supply tank. Dimensions are 11 1/2 x 14 1/2 x 12 in., weight of the unit is 35 lb.

Lear-Roscoe Div., Lear Inc., Allen Rd., Elyria, Ohio.

Governor Controls Three Speeds

New three-element speed sensitive switch governs or clamps three elements at three different speeds between 1,200 and 10,000 rpm.

The model G1A3 governor can be arranged for mounting on a standard aircraft AND30005 engine instrument drive pulley, and is available in electric drive, self-lubricating shaft, SAE distributor thread, and bolt or chain drive. Special water/oil separator unit can be furnished.

Spencer-Smith Products, Inc., Skokie, Ill.



Tester for Material Hardness

Dynamic hardness tester uses a cathodoluminescent with a 500-lb. crushing machine to check materials ranging from soft plastics through tough steels. Two models are available: Model 164-M for testing metals; Model 164-C for concrete. The same technique offers to test two or three samples of products submitted by other test parties.

Taken Instrument Corp., 111 Country St., N. Tonawanda, N. Y.

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Vane-type air motor developing one horsepower in less than 15 in. long x 3 1/2 in. dia. (series specific type) and less than 12 in. x 3 1/2 in. (series specific type). Koller Tool Division of Gardner-Denver, Grand Haven, Mich.

Helipot T-35-A is set to desired value with positive lock in one-fifth of second of a five-dial decade box. Total resistance range 100-100,000 ohms—Helipot Corp., 316 Meridian Ave., S. Pasadena, Calif.

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erates on any regular 100-v. 60 cycle
line, the maker states—Toscani Engi-
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Utica, N. Y.

Air line engines and conversion pro-
vide high volume air passage and re-
tain tight under high pressure, the
manufacturer reports. Units are quick
disconnector type—Am Engineering Corp.,
Brynar, Ohio.



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Fueling truck used with underground
pneumatically driven lift and aircraft
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- May 15-National Fun Fair/Poltergeist Ann.,
jazz, variety shows, Netherland
Pais Hotel, Cincinnati
- May 16-28-National Materials Handling
Exposition, produced by Clapp & Peck,
International Amphitheatre, Chicago
- May 15-19-Air Sciences International
Round, technical symposium on the com-
munications radio system, Washington,
D. C.
- May 18-20-National Television Conduc-
tion, Marmon Hotel, Chicago
- May 18-20-American Society, 4th
William Wright Memorial Lecture Series
Institute, London Lyndon Dr. C. S.
Duper, head of the Department of Aero-
nautical Engineering at Massachusetts
Institute of Technology
- May 19-20-Aerial Photo Communications
Ann., global communications conference,
Columbian Hotel, New York
- May 20-21st Congressional Airfield Board
of Aerial, annual meeting, University
Club, New York
- May 22-24-American Society for Quality
Control, with annual convention, Hotel
Statler and New York, New York
- May 26-28-Eastern States Aeronautics
Symposium, Hartford, Conn.
- May 29-30-International Aeronautical Science
Symposium and INAVI, Royal Netherlands
Aeroclub, 5th International Air Display,
Trompsburg, Amsterdam
- May 30-June 4-Aviation Week Ann.
1955 annual convention, King Edward
Hotel, Toronto
- May 31-June 3-Design Engineering Show,
produced by Clapp & Peck, Inc., Con-
vention Hall Philadelphia
- June 5-Building Aircraft Service, with an-
nual Maintenance and Operation Meet-
ing, Reading, Pa.
- June 6-Canada's National Air Show, To-
ronto
- June 8-10-American Welding Society, third
annual Welding Show, Municipal Auditor-
ium, Kansas City, Mo.
- June 8-10-30th All-Weather International
Air Fair, Washington, D. C., to Hawaii,
Cuba
- June 10-15-Twenty-first International Avia-
tion Display, Le Bourget Field, Paris,
France
- June 12-15-Society of Automotive Engi-
neers, Cadillac Anniversary meeting, Chi-
cago-Haddon Hall, Atlantic City, N. J.
- June 12-15-Pennsylvania Photo Council,
Photo Publication Contest, Cochran
Field, Bedford, Pa.
- June 13-14-Wagon's Automobile Ann.,
annual Show/Drive Derby, Little Rock, Ark.,
to Evans, N. M.
- June 14-15-Philadelphia Junior Chamber
of Commerce, third annual Transcon-
tental Air Cruise, Palm Springs, Calif.,
to Philadelphia
- June 20-25-Institute of the Aeronautical
Sciences and the Royal Aeronautical So-
ciety of Great Britain, 5th International
Aeronautical Conference, IAS, Reading,
Los Angeles
- June 22-25-Symposium on Electromagnetic
Wave Theory, University of Michigan,
Ann Arbor, Mich.
- June 26-July 3-National flight course on
Electronic Technology, Massachusetts In-
stitute of Technology, Cambridge

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Accountants Board. This type of error would have to obtain license from the Board in proceedings similar to that for arbitrators under the measure.

State Department is anxious to go for them. The Assistant Secretary for Economic Affairs Stuart Womack urged that Presidential approval be required for all air contractor licenses for open bids in the international field.

Defense Department, in turn, had a word of caution. Dwight Howard, chief of the general counsel, Air Force, and the department wanted it made clear that CAB regulations would permit one nation to perform services on "a non-flexible basis."

Subsidy Separation

Disavowal of subsidy paid from airlines by establishing road rules in one proceeding and subsidy "assistance" as another, had unanimous support from CAB, Commerce, Post Office and General Accounting Office.

For "complete separation" of the subsidy program from mail and transportation services, Post Office proposed that all air carriers be made eligible for subsidy—paid not more than that carry mail, as in patent.

► **Class Settlement**—Post Office Solicitor Ake Giff considered. Otherwise, when CAB can know if the question of whether a carrier should be authorized to engage in the transportation of mail, its decision may be influenced by the fact that the carrier is a profit enterprise will influence the carrier to claim subsidy.

"To eliminate that possibility, the Post Office Department argues that the right to obtain subsidy be completely divorced from the transportation of mail, so that a mail certificate is not the initial requirement for claiming subsidy."

We are not proposing that government, indirectly, be expected to cover its aid all air carriers. The carrier must prove that the particular service it is authorized to perform merits subsidy before it is entitled to receive it."

General Accounting Office endorsed a Magnuson proposal to establish a "talent administrator," who would make initial decisions on subsidy allocations by the CAB as a way to separate further the mailmaking and subsidy functions. But the proposal had no other government support.

► **Elimination of Subsidies**—Removal of sign of the domestic airlines from eligibility for subsidy at some assembly early date was suggested by Commerce spokesman. Under Secretary for Transportation Louis Rialto said, "With the inevitable trend toward increased self-reliance," he recognized, "similar action may be suitable for various other segments of the indus-

try in the not too distant future."

Magnuson pointed to the difficulty of writing legislation covering airlines from subsidy, especially "which would not permit them, which had already been told and all officials. Rialto said, "We would not want to drift a proposition."

Current Accounting Office's spokesman, Robert Kuttler, reacted to the committee's proposal the issue started by the committee, originally advanced by former Under Secretary of Commerce for Transportation Robert Murray, of setting both thresholds in the gradual elimination of subsidy payments to airlines, and the gradual removal of the Kuttler's solution. If a non-subsidized line should have need of financing it could have recourse to government loans at government-guaranteed loans.

Mail Pay

Changes in the formulae for determining mail pay by requiring CAB, an international crew, to take into account the United States Government Rate, and in domestic cases to pay for maximum loads were unanimously opposed by

CAB Approves Cargo Airline Participation in Mail Test

Entry of all cargo air carriers into the mail and mail program has been opposed by the Civil Aeronautics Board, but the decision has been challenged by the airlines.

The CAB has decided to remove its policy of excluding cargo airlines from the mail program, which has been challenged by the airlines. The CAB has decided to remove its policy of excluding cargo airlines from the mail program, which has been challenged by the airlines.

The air mail-carrying airlines, led by American Airlines and National Airlines, have gone to court to block the move. This has led the U.S. Court of Appeals for the District of Columbia to review the decision and keep the CAB order from going into effect pending the review.

The Board has voluntarily stayed its enforcement of its order until May 11 to allow the court time to hear the review.

► **Board Ends**—In reviewing previous denial of the cargo carriers' application, the Board ruled that:

- It would not consider the cargo carriers to keep them out of the experiment considering its temporary nature while a long formal proceeding is prosecuted.
- The Post Office Department supports the cargo carriers' application and needs to

CAB, Commerce and Post Office. Post Office's Giff emphasized that the UPU regulations, setting both rates to be paid to the carrier and to the airlines, in the presence of a foreign airline, are highly advantageous to the U.S. in fiscal 1954. For example, he pointed out, payments of UPU rates to U.S. airlines would have been \$10 million, but payments to the U.S. to foreign airlines would have been \$2.2 million.

But, at the U.S. Post Office had to pay the maximum UPU rate of \$1.11 a ton-mile to dispatches of U.S. mail by U.S. carriers. Giff repeated the "service" paid to the U.S. carriers would be \$115 annually or \$97 million more a year than the total "service" mail pay, plus subsidies, now being paid of \$10 million.

Establishment of maximum mail loads in domestic service, Giff observed, would force the Post Office to change its present practice of dividing mail between competing carriers or maximum schedules of the same rate. Otherwise, he added, the department would have to pay for "featherbed loads."

Lead out as much as it can in order to furnish information on which to base a sound policy on air transportation of surface mail.

► **Complete the experiment**—his going. The Board said it was the principle of "service's getting left or poor by reason of an exception" to the experiment.

The three carriers involved are currently before the CAB in cases relating to removal of their certificates. These removal cases include consideration of breaking the no-mail barrier included in the original certification of the all-cargo carriers. The exemptions issued last week by the CAB terminate such days after decision in the certificate cases.

► **Dismissing View**—The airlines are arguing that the CAB has no authority to issue such an exemption to carry mail in carriers which are not certified to carry mail. And, assuming the Board did have the authority, the airlines maintain the applicants have not made a sufficient showing of need or public interest to warrant issuance of partial certificates.

Board Member Gene Gurney, who dissented when the CAB decided in December 1953 it had the disputed authority, has dissipated with the majority. He takes the view that the Board has no authority to remove the Civil Aeronautics Act to issue exemp-

tions for mail transportation to carriers which don't hold mail certificates. He also feels that the applications don't meet exemption requirements of the act. And if there were no legal impediments, Gurney feels that granting of the exemption at this time, instead of the public.

The majority decision makes clear the fact that the cargo carriers will be paid a regular service rate common to other carriers participating in the experiment and that no subsidy is contemplated.

CAB Over-Rides CAA On Pacific Route Pay

Civil Aeronautics Board has not freed its decision to equalize Pacific mail rates (AUG. 11, p. 175), despite objections of Pan Am and some World Airways that the move is "discriminatory."

At the end of March, the Board decided to set a standard schedule in the Pacific for purposes of mail pay. Mail moved between either San Francisco and Seattle and Tokyo would be paid for by the Post Office Department on the basis of \$6.03 on the Seattle-Tokyo mileage on Northwest Airlines' route.

Pan Am objects that it will get paid the same amount of money for hauling the same amount of mail 1,600 mi. farther than Northwest, at either schedule, as rate to 33 cents a ton-mile. While NW will get the transport rate of 30 cents a ton-mile.

Concrete the Post Office plans to have any of the present participants in the Pacific mail program to break the tax contract in the coming year. The rate of mail pay is estimated at \$2,218,000 annually. The CAB decision is an attempt to ensure an even distribution. Without it the bulk of the mail would probably go over Northwest's shorter route, since it would be cheaper.

The Board feels that the net effect would be an increase in Pan Am's average mail and profit cost in the general mail market.

It also feels that public interest would be served if the move of the schedule were not standardized.

The action applies only to the temporary route. The intention will be reviewed in the final rate proceeding.

Nazmap N, Y-S, F, Flights

Nazmap transatlantic flights between New York and San Francisco will be maintained May 6 by United Air Lines.

Two Douglas DC-7s' roundtrips are scheduled daily over the 3,000 mile route. Flight times of 4 hr 45 min outbound and 7 hr 15 min inbound are in effect from our service between New York and San Francisco.



Canadian Pacific May Buy Comets For 'Fast' Transpolar Schedules

Canadian Pacific Airlines is planning to buy de Havilland Comet 4s for its transpolar Vancouver-Amsterdam route. CPA probably will order 12 of the fastest powered transports at \$12.8 million each.

A first contract would increase de Havilland's backlog for the Comet 4 to 12, including British Overseas Airways Corp's order for 10 of the long-range jet airliners (AW May 28, p. 15).

► **Complete Path**—The proposed transpolar operation would be Canada Pacific's second in the world. The airline's first jet transport, a Comet 1A, reached during takeoff from Toronto, Ont., on March 1953.

CPA President Grant W. McGonigle says the "complete birds" in the world.

"We are convinced the Comet will be the best aircraft in the field," he says. De Havilland's delivery date of 1954 puts the Comet ahead of any other (fastest-powered) aircraft in the world."

► **10th Line**—McGonigle expects to begin operating Comet 4s on the 4,570-mile transpolar route in 1950, replacing Douglas DC-7s scheduled to inaugurate over-the-pole service between Vancouver and Amsterdam June 1.

The jet transport would cut flight time on the route to 10 hours, compared with 14 hours now made by the DC-68. With the airplane fast

differential a westbound Comet leaving Amsterdam at noon would arrive in Vancouver at 2 P.M. local time.

Canadian Pacific Arctic service will consist with the airline's flights from Vancouver to Tokyo and Hong Kong on the Great Circle route and to Britain via Honolulu.

With this route network, CPA probably will reduce a large part of the European traffic now traveling from the West Coast to U.S. air carriers.

The postpaid problem in getting set to operate the polar service was apparently less simple, according to a CPA report. It is already evident that Vancouver-Amsterdam will be one of the best flying routes in the world.

► **Speed**—Canadian Pacific is expanding its DC-4s with polarized doors, non-diverting gear, compass (Sperry GS and Radio Aids Path), and the Kollsman Stormscope.

On the route ADP will be available to CPA transport between Vancouver and San Francisco. Loran in the western segment and between Cleveland and Amsterdam on the eastern extension, and Capital from San Francisco to Amsterdam.

Despite the number of navigation aids, Canadian Pacific's navigation plan will be over 200 miles during the entire transpolar flight.

Heliport Setback

Heliport construction, blocked in earlier years by prohibitive land costs and lack of municipal planning, received a new catalyst in Cleveland.

Cassius F. Fudge, judge Joseph A. Art and state aid made a zoning regulation under which Cleveland Air Taxi, Inc. was granted permission to build a small field adjacent to the Shaker Heights residential area.

A Shaker Heights resident against the proposed heliport would create a nuisance.

Art then asked that the plaintiff limit its case by cert. that the heliport and the legislation pending Cleveland. As Art is under construction was an attempt by the case being based to effect in an unlawful deprivation of legislative authority.

Pan Am to Get New Co-Terminal to Mexico

Pan American World Airways has been recommended by Civil Aeronautics Board its permanent facilities area between Los Angeles and Santa Monica City plus a five-year trial with San Francisco as a co-terminal.

George F. Brown, W. Brown, special aid in reply that the extension decision PAA the right to curtail local traffic between the two California gateway cities.

Brown said that due to restrictions, the authorities for San Francisco service should be limited. Brown termed it a problem "of whether the benefits are paid to the light of a possible decrease in subsidy payments to PAA and decrease of revenues from other carriers now operating between the cities of Los Angeles and San Francisco."

It was indicated that suggestions of Pan American (Los Angeles) to extend to Guadalajara will result in "minor" decreases of approximately \$50,000 to Western Air Lines and \$30,000 to United Air Lines.

Capital Sells More DC-4s

Capital Airlines has sold seven more DC-4s, with delivery to the purchasers contingent upon acceptance of the so-called ordered Vietnam on a plane for lease basis.

It is believed to be the second sold to West Coast operators (AW May 7, p. 35). Capital sold three to Nucleon Air Lines, three to Jorge Garmez and one to an undisclosed purchaser. Capital has 13 DC-4s on its fleet; eight are at 25 on the market for lease or de-lease to mid-1958.

More Airlines Report Salaries

Salaries, bonuses and other fees paid in 1954 by the certified scheduled airlines to their pilots have been reported to the Civil Aeronautics Board. Other payments are previously reported in Aviation Week (Apr. 18, p. 127; Apr. 25, p. 117, May 7, p. 87).

Norfolk Airlines Inc. (Norfolk, Va.) reported and showed \$114,000 salary, \$10,000 bonus and \$10,000 other fees. \$114,000 salary, \$10,000 bonus and \$10,000 other fees. \$114,000 salary, \$10,000 bonus and \$10,000 other fees. \$114,000 salary, \$10,000 bonus and \$10,000 other fees.

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CAB ORDERS

(Apr. 23, 1957)

GRANTED
North Central Airlines permission to fly Air Force 100 (Boeing 707) from Denver to Chicago.

GRANTED
Kable Airlines an exemption to permit its C-47 to fly from Boston, Mass., to New York City.

GRANTED
Michigan Airlines an exemption to permit its C-47 to fly from Detroit, Mich., to Chicago, Ill.

GRANTED
California Airlines an exemption to permit its C-47 to fly from Los Angeles, Calif., to San Francisco, Calif.

GRANTED

Alaska Airlines contract, it is noted, since the carrier's proposals have been approved by Alaska Civil Aeronautics in previous months.

Letter of registration of National Air Transport Service and of K. & R. Air Transport, Inc., provided, pending the completion of its application for registration.

GRANTED
Flying Tiger Line's application to perform a charter flight to Alaska to a contract with the U.S. Coast Guard, Alaska, in the summer of 1957.

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Sometimes,
when you're looking for
golden eggs...

You have
to find a
new goose



Sometimes very good men waste their time in unproductive jobs with unimaginative companies, when they should be building their futures with a forward-looking organization that wants them to move ahead.

Fairchild wants good, experienced engineers, the sort of men who'll insist on the right to progress as fast as their abilities warrant.

Right now, aerodynamicists with experience in Boundary Layer Control have a splendid opportunity with Fairchild to take part in Fairchild's pace-setting research and development in this vital field. The right man will be assured good future, high salaries, and plenty of room ahead to progress in.

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Aircraft Division
HARTFORD, CONNECTICUT

'where the future is measured in light-years'

SHORTLINES

► Australian airlines are reported asking for a 5% fare increase to cover rising operating costs.

► American Panama will inaugurate a Miami-Panama service May 6, using DC-6 equipment through an agreement with Taca Caribbean Airways.

► British European Airways will inaugurate the first direct service between Manchester and Milan in June with Modern Viscounts.

► **British Overseas Airways Corp.** resumes Chicago-London service May 5 with a weekly tourist-class Stratoservice flight via Montreal and Glasgow. . . . Stratoservice will replace Constellation as BOAC's North Atlantic transport as these become available.

► **Bozell Airways** has started direct service between San Antonio, Tex., and Denver via Austin, Dallas, Fort Worth and Oklahoma City. The service will be operated daily with 41-passenger Cessna Learns.

►COPA, the Panamanian flag airline, has received a permit to operate between Panama and San José, Costa Rica.

■ Lake Central Airlines reports March passenger sales increased 30% over the same month in 1954. Passenger sales have gained 31% in March and 50% in the first quarter over the same periods of last year.

► Pan American World Airways will increase service to Saigon and Singapore to three flights a week starting May 16 . . . PAA reports a 22% increase in passengers traveling through the Miami gateway in the first quarter of 1974 over 1973.

► Qantas Empire Airways is adding a second weekly stopover service between Australia and Japan. Flights will operate between Sydney and Isehara via Darwin and Manila.

• **Kidde Airlines** reports freight traffic peaked 20% in the first three months of 1957 over the first quarter of 1954. The carrier lifted 5,535,029 lb. of freight between New York, Florida and Puerto Rico between January and March.

► **Texas-Texas Airways** reports record passenger traffic in March. The airline flew 12,587 passengers with a load factor of 86.18%, 29% above the March 1964 load factor.

ADVERTISERS IN THIS ISSUE

AVIATION WEEK—MAY 9, 1955

[illegible]

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New 8" Speedzone has bench work on magnets, carburetors, instruments and sub-assemblies 22 oz. weight.
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1. The first step is to identify the problem. In this case, the problem is that the company is not meeting its sales targets.

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Notes From the Missile Country

(The following notes are settings from the editors' notebook during a two-week trip to USAF, Army and Navy missile test centers in the Southwest and the Atomic Energy Commission Nevada proving ground.)

Special Weapons Center
Albuquerque, N. M.

Brig. Gen. William A. Cantelero, commander of AFDC's Special Weapons Center, says major progress has been made during past two years in designing atomic weapons capability into new military aircraft from their aerophiles. Special Weapons Center is responsible for getting the capability into all new USAF planes that require it and works through the Weapons Systems Project Office at Wright Air Development Center, Dayton, Ohio, to transmit its data to aircraft and missile contractors concerned. Special Weapons Center also provides Strategic Air Command and Tactical Air Command with information on atomic blast, flash and radiation effects required for training exercises in delivery techniques.

New 12,000 ft. runway at Kirtland AFB is completed and will soon be used by the first Boeing B-52 Superfortress to be assigned to the center. The 425th Aerospace Test Group has made all atomic weapons and test device drops on the Nevada proving grounds and is proud of its record of only one aborted mission.

Holloman Air Development Center
Alamogordo, N. M.

Brig. Gen. Langdon L. Davis, Holloman commander, says the development workload of this missile test center has more than doubled during past two years. Current belief is that USAF missile program is now over the basic research and development hump. Main job now is working out development time on specific mission to provide them with operational reliability required for combat use. USAF is planning to use Holloman in the future to train carrier organizations in field handling and use of missiles.

Holloman has a group of 30 former German scientists headed by Dr. Ernst Storauf, Pennsylvania graduate, who still has openings for more civilian scientists. Dr. Storauf believes considerable basic research needs to be done and fundamental theories originated in the field of hypersonic speeds from Mach 6 to Mach 20—before intercontinental ballistic missiles and space vehicles can be successfully developed. Maj. David Simons, head of the space biology laboratory, reports that high altitude experiments with various types of animals indicate pilots can operate at 90,000 to 120,000 ft. altitude for 60 hours with no ill effects from cosmic radiation.

High altitude balloon test at Holloman has done interesting work in miniaturization of balloon control devices and high altitude research instrumentation carried in payload packages in the upper atmosphere program. These balloons will also be used in experiments with anthropomorphic dummies to test pilot bail out problems at altitudes above 90,000 ft. Data from dummy tests will lead to later experiments with human pilots bailing out from these balloons.

Signs in the Holloman launch room warn military and civilian personnel that radioactive tracers in being used as new research rockets to help recovery teams locate their misrouted nose cones after firing on the vast desert expanse of the Holloman range.

White Sands Proving Grounds, N. M.

Maj. Gen. E. L. Chausse, Chief of Arms Ordnance, says more than 80% of its missile research and development funds now go to industry. Redstone Arsenal at Huntsville, Ala., is now the Army's chief clearing house for missile information. All introductory reports from Army field forces equipped with missiles funnel through Redstone which routes all contractor and Ordnance-developed tests. Materiel will use the Army's Hoveat John rocket. Contractors to popular opinion, Navy's Terrier and Army's Nike, both with small ram jets, do not represent duplicated effort. Terrier is a shipboard system designed to fundamentally different combat requirements than the sea-defense goal of the Nike. Army Ordnance is contracting with missile manufacturers to get technical representatives in the field with combat units using missiles to better better maintenance and field service during early field operations. Navy missile experts are extremely pleased with the effectiveness of the controls on late versions of the Glenn L. Martin Co.'s Viking high altitude research rocket. Viking has performed some strange tricks in flight through use of these controls.

Atomic Energy Commission
Nevada Proving Grounds

Juan E. Rivas, AEC test manager, says the Nevada proving ground has "perhaps doubled the rate of acquisition of knowledge in the fields of weapon design and weapon effects. Our continental unit's greatest value is in the time it saves in development of weapons." Example of this close and swift relationship between AEC's weapons development laboratory at Los Alamos, N. M., and the Nevada test operations were the two additional tests failed since the current Operation Tropic tests were that are designed to answer technical questions raised by the results of earlier blasts in this series. Total of 45 atomic shots will have been fired on the Nevada site when Tropic's 14 blasts have been completed. Dr. Alvin C. Graves, scientific advisor to the test manager, outlined experiments to be conducted during and anticipated after the 40 Jupiter Gun shot. These include one for the military, 16 for Los Alamos laboratory, one for Lawrence Livermore and 45 for civil defense. Dr. Graves and AEC has not yet tested a guided missile in the Nevada operations. As drops on the Nevada site have ranged from bursts only a few hundred feet above ground to above 30,000 ft. Air bursts produce little radioactive fallout. Problem of fall out from firing nuclear test devices from desert towers (tower for test shot is about as high as the Washington Monument) is getting so serious due to vaporization of the structural steel used as tower and its supports that AEC is considering use of anchored balloons to mount both atomic test devices and instrumentation.

—Robert Helt

RADAR GUNSIGHT HELPS
TAC PILOTS BAG "FOE"

Korean-tested Device Proves Deadly Accurate in Stopping Jet "Invaders"

THE STORY BEHIND THE STORY

Most at home where jet streams are constantly being stirred, there's a good chance of detecting and intercepting hostile planes before they reach their destination. And abroad, as you've probably noticed from headlines like the one above, there are good this system would be anticipated and that America's fighters from our overseas bases or from NATO allies.

One reason for the impressive results resulting demonstrated by Tactical Air Command pilots at various airbases was the training. Another is the accuracy of the jamming jammer (TAC) used in Korea and new service jet and NATO squadrons. Here's what it does in the words of General "Jimmy" Doolittle.

As you notice you are chasing a small and elusive target, and you have only one shot in three or four. You are not only in a bad position, but you are also in a bad position, and you are also in a bad position.

and range of the target on the radar, and it is better to not even if they could you back time for necessary instructions. The new jammer does this for the pilot. He is then on a different level and does not rely on his own skills. When the jet is in the air, the jammer will stop the target, he first.

Developed through the joint efforts of the Instrumentation Laboratory of the University of Michigan, Dr. C. Stark, Draper, Sperry, and the Air Force Research Laboratory—the radar gunsight is an example of teamwork, at its best—providing better weapons for defense efficiently and economically.

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